

# SOUTHERN POWER AND IN

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JUNE, 1957

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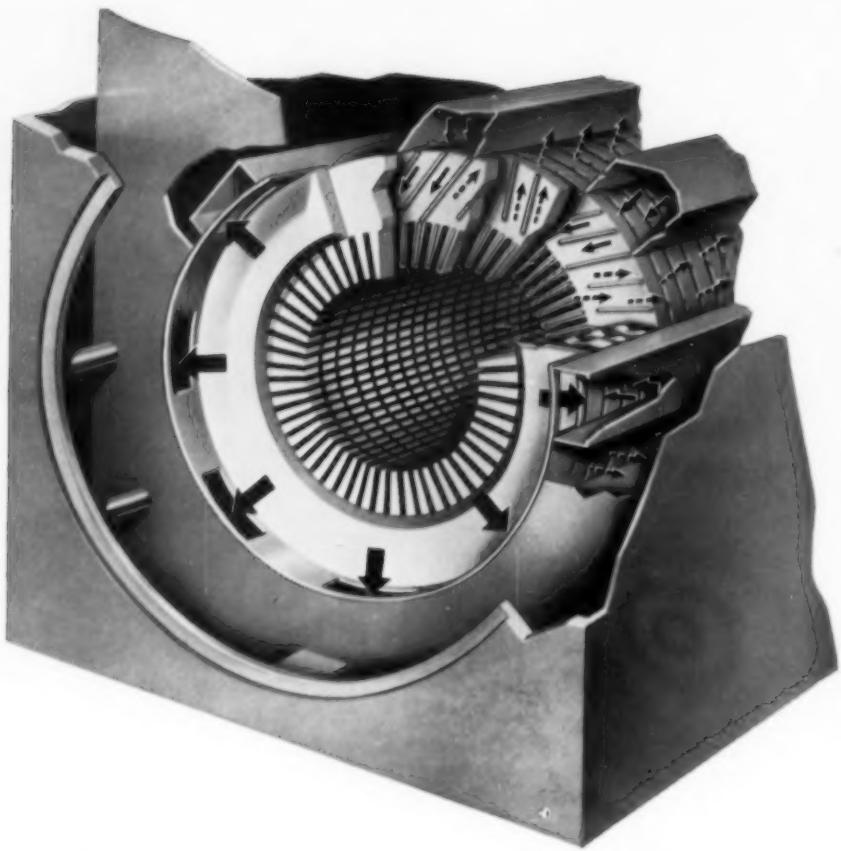
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## **Spiral Ventilation of Two-Pole Motors**

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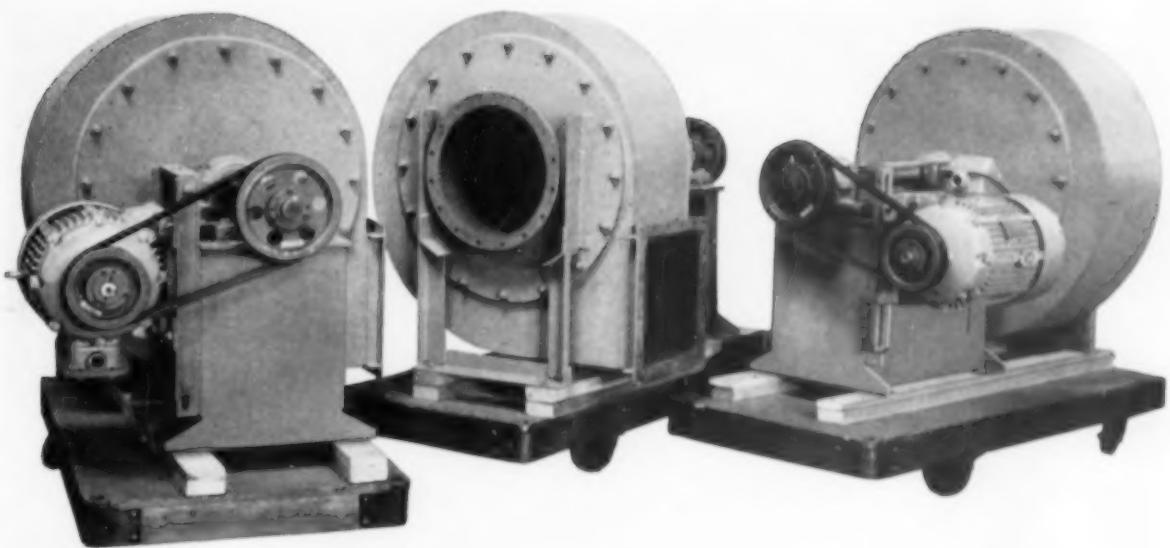


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**Volume 75**

**Number 6**



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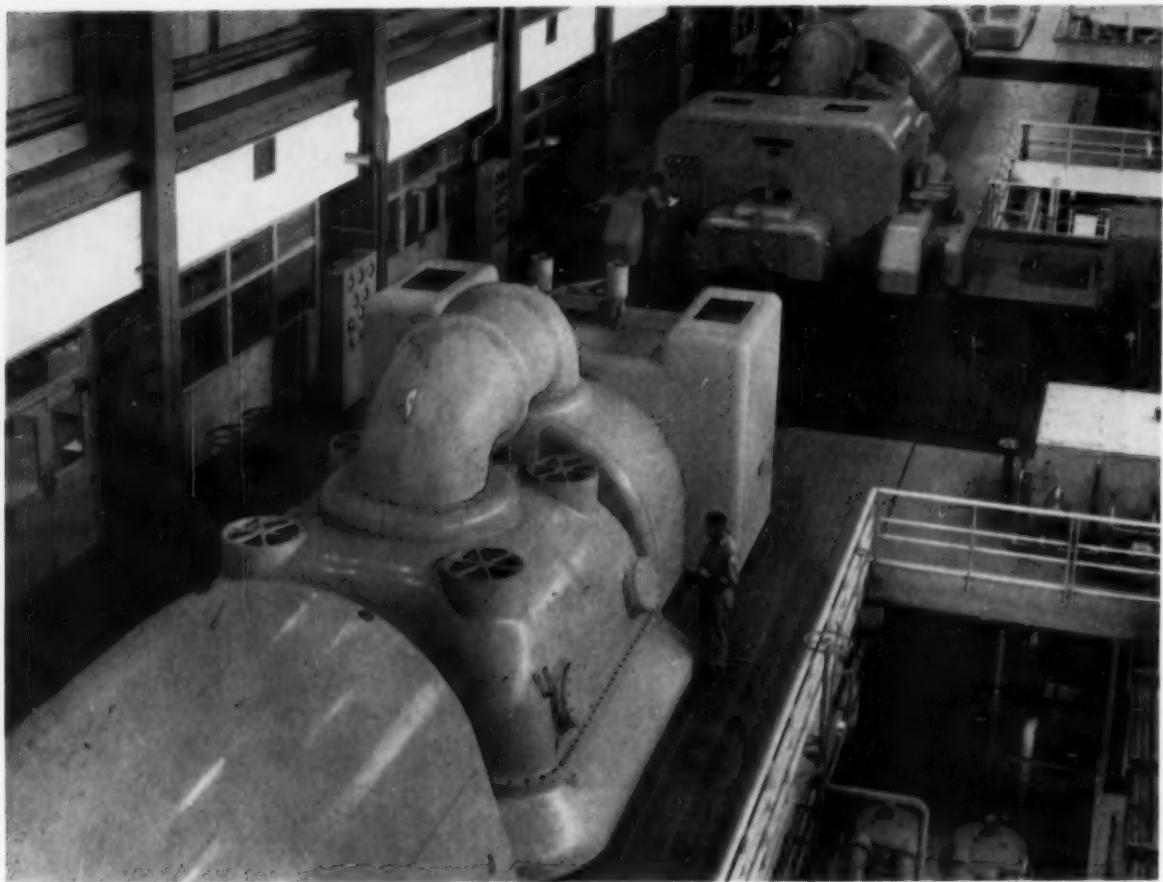
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SOUTHERN POWER & INDUSTRY for JUNE, 1957

For more information, use Reply Card—Page 103



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# SOUTHERN POWER AND INDUSTRY

Vol. 75  
No. 6

JUNE, 1957

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# Facts and Trends

## FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

June 1, 1957

- ◆ **LARGE STEAM TURBINE ADVANCES** discussed by Allis-Chalmers' chief turbine design engineer at the 19th annual American Power Conference included the world's first 300-mw unit, using the close-coupled cross-compound arrangement that is equally advantageous for 3600/1800 rpm and 3600/3600 rpm types; a 250-mw centerline-at-floor-level unit for which close-coupling was pioneered; and, tandem triple-flow units in the 200 to 250-mw range, representing the currently large ratings for 3600 rpm single-shaft machines.

For your complimentary copy of "Advances in the Field of Large Steam Turbines," O3R8620, write: Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.

- ◆ **AIR-SUPPORTED WAREHOUSES** are being used by Duke Power for storage enclosures of utility equipment and building materials at Pelzer, S. C. They are Cid Air Structures made of Fiberthin, a white vinyl coated nylon made by U. S. Rubber.

The 40 x 80 ft structures can be taken down readily and erected elsewhere if desired. The translucent material permits entry of sufficient daylight for usual storage activities. A blower maintains a constant supply of low-pressure air which "supports the structure even when the swinging door is opened for the entry of fork lift trucks."

Structure weighs only 500 lb and costs about \$1/sq ft of floor area, complete with door and blower—erected and ready for use.

- ◆ **COAL-BURNING GAS TURBINES** should have extensive application for power generation in the stationary plant field, according to discussions at the recent Annual Meeting of Bituminous Coal Research, Inc. Greatest potential includes: municipally-owned plants, paper and allied products, chemical and allied industries and plants owned by the primary metals industry. All have process use for the hot exhaust gases from the gas turbine.

Advantages of the gas turbine include: huge amounts of waste heat can be used for process purposes while the equipment is also generating power; a considerable savings is obtained by using coal instead of oil; the turbine requires no water; and very little lubrication is needed.

- ◆ **PUMP APPLICATION** is becoming more and more demanding upon pump suction conditions. Operating temperatures are constantly increasing. Process systems require the operation of pumping equipment under very high vacuums so that the fluid being pumped is very near the vapor point. Chemical fluids with viscous, volatile, and unstable properties make pump selection problems ever more difficult.

The concept of Net Positive Suction Head (NPSH) has evolved to simplify the selection of pumping equipment. SPI has been presenting a series of articles which clarify the basic fundamentals. Part 1 in December, defined absolute pressure and vapor

# ALLEN-BRADLEY

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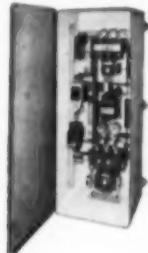
## Reduced Voltage Motor Starters



### AUTOMATIC MULTIPONT RESISTANCE TYPE

Meets power company starting current rules on network systems. Resistors are automatically inserted in the line at starting, and are short circuited in steps at definite time intervals which can be adjusted from 1 to 5 seconds.

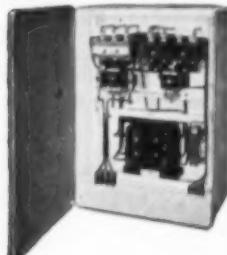
**BULLETIN 741**



### AUTOMATIC STEPLESS GRAPHITE RESISTOR TYPE

The ultimate in velvet smooth acceleration of squirrel cage motors. Lamp flicker on network systems used for both power and light is eliminated. The graphite disc resistors are compressed automatically . . . smoothly and steplessly.

**BULLETIN 742**



### AUTOMATIC AUTOTRANSFORMER TYPE

Utilizes an autotransformer connected in open delta to reduce line voltage for starting squirrel cage motors. Taps are provided on the autotransformer to adjust the voltage applied to the motor.

**BULLETIN 746**

# ALLEN-BRADLEY

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BIRMINGHAM—J. L. Howarth Co., Inc., 825 S. 22nd St., Tel. Tel. 53-1171  
CHARLESTON—Henry E. Payne, 918 Kanawha Blvd. E., Tel. DI 3-1393  
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DUSTON—Wilson Electrical Equip. Co., 3210 Garrow Ave., Tel. Capitol 8-1557  
JACKSONVILLE—Robert F. Smith & Co., 1446 June St., Tel. EBrook 8-0531  
KANSAS CITY—B. L. McCrary & Son, 1819 Central St., Tel. HARRison 1-1668  
KNOXVILLE—Bauditch & Co., 1311 C. N. Broadway, P. O. Box 3145, Tel. 4-2513  
LITTLE ROCK—Curtis M. Stout, Inc., P. O. Box 121, 400 Shall St., Franklin 4-8201  
LOUISVILLE—Riotz & Co., 2209 S. Floyd St., Tel. ALlrose 7-3603  
MEMPHIS—Curtis M. Stout of Tennessee, Inc., 718 M & M Bldg., Tel. JACKson 6-7601  
MIAMI—Lee Smith Co., 121 S. E. First St., Tel. Franklin 1-6766  
NEW ORLEANS—Robbins & Robbins, 1037 Magazine St., Tel. Canal 5805  
PHOENIX—E. P. Weller & Co., 1902 East Raley Ave., Tel. AMhurst 6-3188  
RICHMOND—H. M. Wood & Co., Inc., 2016 Second Ave., Tel. 3-8529  
ST. LOUIS—Harold Julian, 904 N. Grand Blvd., Tel. JEFFerson 5-1901  
SAN ANTONIO—Wilson Elect. Equip. Co., 101 E. Main St., Capitol 4-2344  
SAN DIEGO—James A. Setchell Co., Inc., 301 W. "G" St., Tel. BElmont 3-3981  
TULSA—John W. Elder Co., 1526 East Fourth St., Tel. Diamond 3-9149

### MANUAL STEPLESS RESISTANCE TYPE

Graphite compression disc resistors provide smooth, stepless starting of polyphase squirrel cage motors— prevent lamp flicker. Operated by a hand lever, the smooth starting of the motor is under the control of the operator.

**BULLETIN 640**



### MANUAL AUTOTRANSFORMER TYPE

Recommended where the characteristics of the driven load or power company rules require reduced voltage starting. Double break, silver alloy contacts are standard for air-break starters . . . copper contacts for oil-immersed units.

**BULLETIN 646**



### AUTOMATIC PART- WINDING TYPE

For use with squirrel cage motors having two separate parallel stator windings. Two types—Style A, two step starter; Style B, three step starter having resistance in series with motor on the first step.

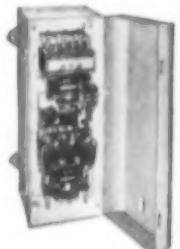
**BULLETIN 736**



### AUTOMATIC GRAPHITE RESISTOR TYPE

Graphite disc resistors are automatically inserted in series with the squirrel cage motor at starting. These resistors can be steplessly adjusted for motor and load conditions, resulting in remarkably smooth acceleration of the motor.

**BULLETIN 740**



Allen-Bradley Co.  
1328 S. Second St., Milwaukee 4, Wis.  
In Canada—  
Allen-Bradley Canada Ltd., Galt, Ont.



## Facts and trends (continued from page 4)

pressure. Part 2 in January discussed cavitation and Part 3 in February presented calculations of NPSH.

Design and performance factors influencing the NPSH required by modern centrifugal pumps is featured in this issue.

- ◆ FIRST NEW BUTADIENE PLANT to be completed by private industry since the war is the new Texas Butadiene & Chemical Corporation's \$30 million plant near Houston. Axial flow compressors are used for hydrocarbon compression. Plant has nine gas and air compressors, ranging in size from 2,500 hp to 10,000 hp. A central hydraulic power system actuates the cyclically operated reactor valves. The Flouer Corporation (engineers and constructors) believe that this permits quicker operation and more positive movement than other methods.
- ◆ WASTE DISPOSAL PROBLEMS at Shippingport Atomic Power Station are outlined in this issue by SPI's atomic consultant, John F. Lee of North Carolina State College. While the problems are similar, wastes from Shippingport cannot be treated in the same manner as waste from other industries. The striking difference is that radioactivity can neither be neutralized nor destroyed by chemical means.

Three general methods of controlling radioactive wastes have been adopted—natural decay, concentration and storage, and dilution. To illustrate how these methods are applied to the process, a brief description of the system is featured in this issue.

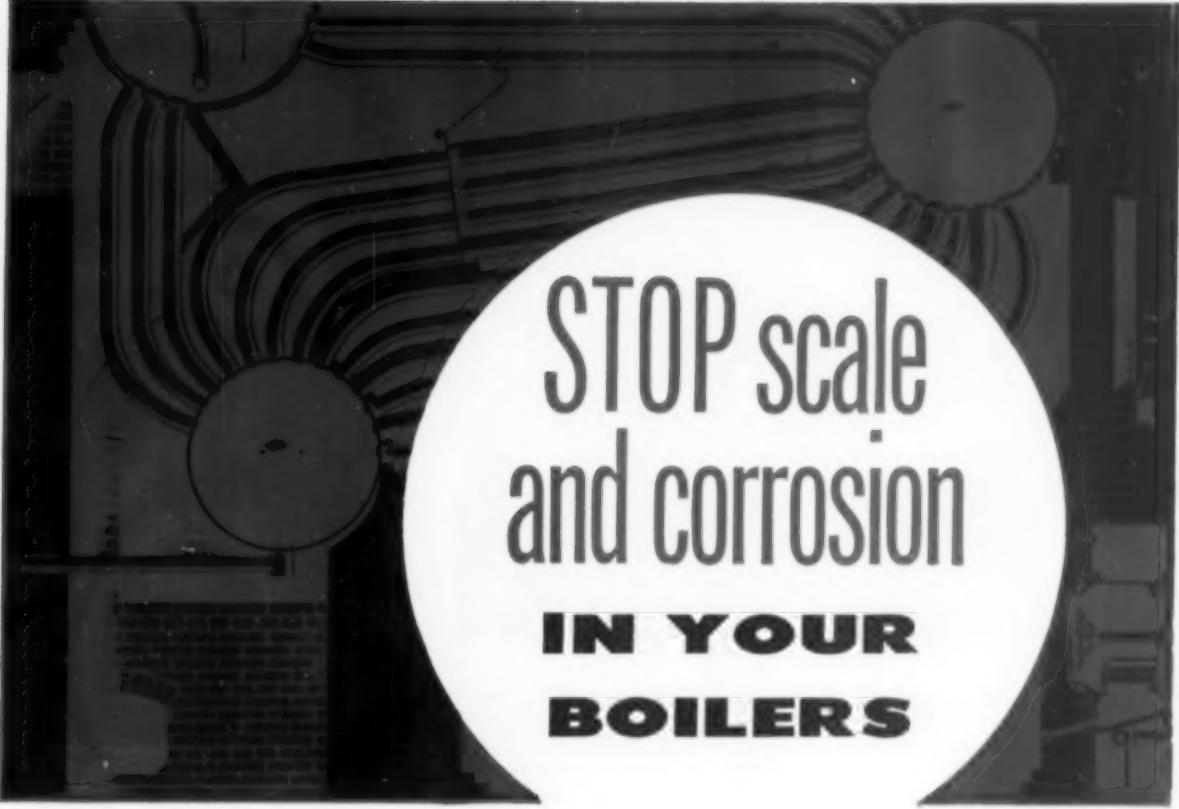
- ◆ WORLD'S SAFETY RECORD for textile plants has been set by the Chemstrand Corporation's big nylon manufacturing plant at Pensacola, Florida. More than 4,800 employees recently topped the previous record of 13,624,000 man-hours without a lost-time injury. This represents the safest work record among the more than 7,000 textile plants in the country.
- ◆ PENALIZED BY PAPER WORK? Then take a look at General Electric's call box reporting system described on page 66. A call box flashes timekeeping, production information to a central office. Automated communications save over 1000 ft of floor space and many man-hours.

- ◆ SPI'S MATERIALS HANDLING ISSUE comes your way next month—July. Case studies from Southern & Southwestern industrial and power plants will demonstrate manpower conservation, increased production, and more profitable use of plant facilities.

Articles will give you ideas for "brainstorming" sessions. You can undoubtedly use many of the suggestions given. But remember that every plant is "unique." Materials handling equipment should be selected to meet specific needs of each individual plant.

Don't expect to get maximum results from halfhearted measures. Materials handling merits thorough intelligent study. Anything you do about it affects the entire plant processing procedure. Read SPI's 2nd Annual Materials Handling issue in July and find out what others are doing. Discuss it with all departments—and if necessary bring in a specialist as consultant on design.

Write the editors for additional information on any of the above items.  
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Every good engineer knows that the costly shut-downs and repairs caused by scale and corrosion can be avoided through the use of the right feed-water treatment. That's why hundreds of the best engineers use Braxton and Flako formulas.

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tive in your area who has broad experience in every kind of industrial water problem. He will gladly analyze your water and prescribe the proper treatment to protect your equipment against costly corrosion and scale. What's more, he will continue to make periodic analyses to be sure you are being properly protected. The valuable service costs you nothing. It can save you much. Let us know when you would like to see him.

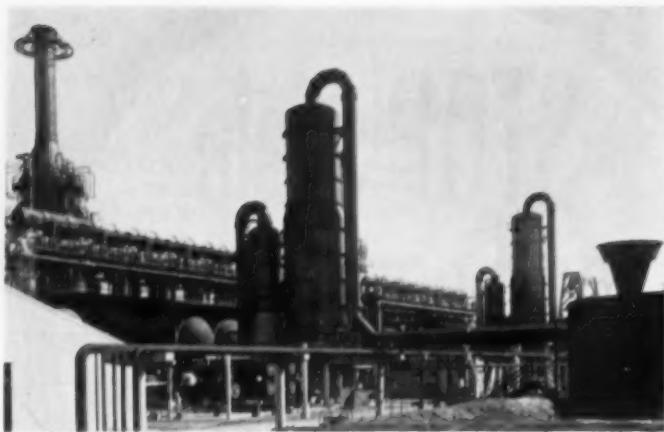
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# NEWS for the South and Southwest



## Texas Butadiene's \$30 Million Plant on Stream

At its new \$30 million dual purpose plant at **Channelview, Texas**, just outside Houston, **Texas Butadiene & Chemical Corporation** recently brought on steam the first of two 43,000 tons-per-year Houdry Dehydrogenation process units. Unit at the right will go on steam shortly. Plant designed, engineered and constructed by The Fluor Corporation, Ltd.

Plant will produce 61,000 tons of butadiene annually and roughly 2½ million barrels of aviation grade alkylate or, alternatively, 86,000 tons per year of butadiene (used in the synthetic rubber, textile, paint and chemical industries).

This is the first new butadiene plant to be completed by private industry since World War II. Axial flow compressors are used for hydrocarbon compression. Plant has nine gas and air compressors, ranging in size from 2,500 hp to 10,000 hp. A central hydraulic power system actuates the cyclically operated reactor valves. Fluor believes that this permits quicker operation and more positive movement than other methods.

## Chain Belt — South & Midwest

**Chain Belt Co.** has appointed **William Sivyer** as Midwest and Southern Regional Manager.

Mr. Sivyer joined Chain Belt Company in 1945. After a training period in Milwaukee, he opened a District Sales Office at Philadelphia and has been manager there since that time.

His new duties entail overall responsibility for **Atlanta**, **Birmingham**, **Buffalo**, **Charlotte**, **Cincinnati**, **Denver**, **Jacksonville**, **Kansas City**, **Minneapolis**, **St. Louis** and **Toronto**, Canada, District Offices. His headquarters will be located in Milwaukee.

## Frick — St. Louis

**John H. Carter** has become manager of the St. Louis Branch Office of **Frick Company**, of Waynesboro, Penna. This Company is one of the oldest in the country building air conditioning, refrigerating, ice making and quick freezing machinery.

Mr. Carter was with Frick Company and later with their St. Louis Distributor, Kremer-Hicks Co., from 1934 until he entered the Navy in 1942. Since 1945 he has been a consulting engineer specializing in refrigeration and air conditioning, and has also been a project engineer with Sverdrup & Parcel, Inc.

## Western Precipitation's Annual Sales Meeting

At the recent annual sales conference of Western Precipitation Corporation, the organization's most recent developments in the fields of Cottrell and Multiclonel dust and fly ash recovery equipment were given top billing, along with new applications for the Dualaire Reverse-Jet Dust Collector and for the Holo-Flite heat exchange equipment.

The new Western Precipitation Automatic Precipitator Control — a far-reaching advancement in the field of electrical dust collection — created a great deal of interest. This unit not only automatically maintains electrical precipitators at their optimum operating efficiency regardless of changes in the nature of the gas stream, but it does this without use of vacuum tubes, relays, high speed moving parts or other high-maintenance components. It also employs a completely new "sensing" principal that assures more precise control than heretofore available in equipment of this type.

The recently introduced 9VGR Multiclonel Mechanical Dust Collector — the latest advancement in Western's 30 years of Multiclonel design and installation experience — was displayed and its many unique advantages demonstrated. This new unit features an advanced type of shell construction that eliminates need for external bracing, and permits other important economies and simplification in installation. Also, it incorporates a new stepped tube sheet that prevents dust stratification and insures more uniform distribution to the collecting tubes — therefore, greater collecting efficiency.

## G-E — Rome, Ga.

**G. P. Vest** has been appointed manager of marketing for the **General Electric Medium Transformer Department**, Rome, Georgia.

(Continued on Page 12)

# How to Save

TIME \ MONEY \ ENERGY



### TYPE A GENERAL PURPOSE PUMPS

For application to the widest variety of pumping conditions. Single stage split case design. Capacities: up to 70,000 gpm; heads: up to 300 feet. All types of drive.



### TYPE AS GENERAL PURPOSE PUMP

The centrifugal pump with mechanical shaft seals that eliminate the packing box. Up to 4" in discharge sizes. Capacities: up to 750 gpm; heads: up to 210 feet.



### TYPE TU BOILER FEED AND PROCESS PUMP

2-stage high pressure pump for water and other liquids. Capacity: 50 to 3500 gpm; heads: up to 600 feet. Internal cross over is built into top half of pump case.



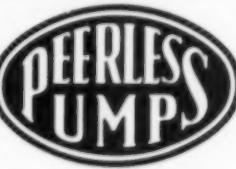
### TYPE TUT MULTI-STAGE PUMPS

3, 4 and 5-stage pumps for water handling and process services. 1" to 5" discharge sizes. Capacity: up to 1350 gpm; head range: up to 1600 feet. Split case design.



### HI-LIFT PUMPS

The unique positive displacement deep well pump that literally squeezes water upward. Capacity: 10 to 55 gpm; lifts: up to 1000 feet. For wells 4" in diam. and up.



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### TYPE PE FLUIDYNE INTEGRAL HP PUMPS

A complete line of electric close-coupled general purpose pumps. Threaded or flanged connections. Capacities: up to 800 gpm; heads: up to 260 feet; motors: up to 50 h.p.



### TYPE PB FLUIDYNE GENERAL PURPOSE PUMPS

Flexible coupled, single-stage, end suction, general purpose pumps. Rugged and durable. Capacities: up to 5500 gpm; heads: up to 260 feet; motor: up to 150 h.p.



### VERTICAL DEEP WELL TURBINE PUMPS

For application to deep well pumping. Lifts from 1000 feet or more. Capacities: up to 30,000 gpm. H.P. range: up to 1000 h.p. oil and water lubricated types. Widest range of sizes.

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FROM THE  
**COMPLETE  
LINE**



### INDUSTRIAL SERVICE PUMPS

For application to pits, sumps, basins, reservoirs and other surface water sources. Same capacity as deep well turbine above. H.P. range: up to 2500 h.p.



### HYDRO-LINE PUMPS

An enclosed, close-coupled, vertical centrifugal process pump for handling petroleum hydrocarbons, where NPSH is limited. Capacities: up to 6000 gpm; heads: up to 1500 feet.



### TYPES DL AND DM PROCESS PUMPS

Single stage, end-suction chemical process pumps with maximum interchangeability of components. Open or enclosed impellers. Packing gland or mechanical seal. Capacities to 800 gpm. Heads to 450 feet. Temperatures: up to 450° F.



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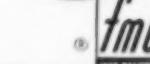
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## with WHIRLEX dust collecting equipment!

If you are concerned with nuisance elimination . . . or with the recovery of process material . . . WHIRLEX can help you. Our research laboratory, engineering and manufacturing facilities are *totally set up* and especially experienced to provide "dollar-saving" solutions to the most perplexing dust collecting problems.

Low original cost *plus* continuous, efficient operation and low maintenance of WHIRLEX equipment assure quickest return of cost dollars!

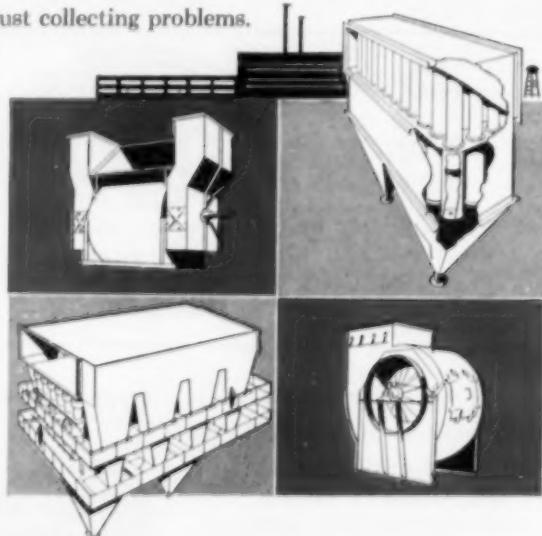
For a completely integrated and co-ordinated installation, the following shop-assembled equipment is available:

WHIRLEX Type CTF Mechanical Gas Centrifuge Collectors

WHIRLEX Type MTS 9CYT Multiple Cyclone Collectors

WHIRLEX Induced Draft Fans • WHIRLEX Forced Draft Fans

Special Duct Work • Self-Supporting Stacks  
Support Structures



Write today for complete engineering data . . .

## THE FLY ASH ARRESTOR CORPORATION

274 North First Street

Birmingham, Alabama



BEACON'S WIDE RANGE OF SIZES IS PREPARED  
ON MODERN SCREENING EQUIPMENT

# BEACON COAL

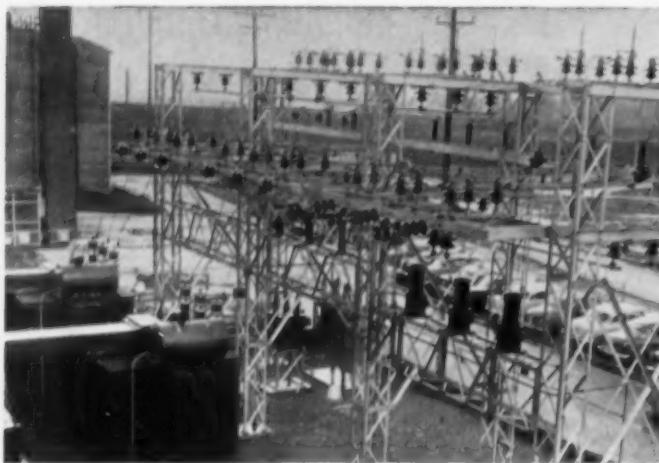


EASTERN GAS AND FUEL ASSOCIATES

PITTSBURGH • BOSTON • CLEVELAND • DETROIT • NEW YORK  
NORFOLK • PHILADELPHIA • SYRACUSE

For New England: New England Coal & Coke Co., For Export: Costner, Curran & Boffin, Inc.

## News for the South & Southwest (Continued)



### Compact Substation for Kaiser Aluminum—Md.

Two men erected the lightweight, prefabricated aluminum structure of this substation at the **Kaiser Aluminum and Chemical Corporation's** extrusion plant in **Halethorpe, Maryland**. Supplied by General Electric's high voltage switchgear department, the custom built, outdoor station is rated 20,000 kilovolt amperes. Compact design made additional parking space for plant employees.

### Cooling Towers Institute

**Paul R. Hoffmann** of **Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Missouri**, has been elected president of the **Cooling Towers Institute**. Hoffmann is president of his company and has served on the board of directors of the Institute since 1950. He succeeds **James P. Wiseman** of the **Fluor Products Company, Whittier, California**.

Other officers elected for 1957 terms at the recent CTI board meeting were: **Karl E. Johnson**, vice president; **Denis E. O'Neil**, secretary; and **Forrest B. Reed**, treasurer.

**Johnson** is vice president and general manager of **J. F. Pritchard & Co.** of California with headquarters in **Kansas City, Missouri**. **O'Neil** is manager of the cooling tower department of **Foster Wheeler Corporation**. **Reed** is manager of sales for **The Marley Company** in **Kansas City, Missouri**.

The Cooling Tower Institute is the national association of the major manufacturers of industrial water-cooling towers. Headquarters for the organization are in Palo Alto, California. **Raymond C. Kelly** is executive manager. Principal research projects sponsored by the

group include field studies of operating cooling towers, investigations of lumber deterioration and wood maintenance and technical studies involved in the development of industry standards. The CTI field service department office in **Houston, Texas**, is under the supervision of CTI field engineer **James L. Willa**.

Extensive field research during 1956 was conducted under the direction of **Ennis C. Smith**, CTI delegate of Hudson Engineering Corporation, Houston, Texas. Determinations of the effect of vapor recirculation on tower performance were completed during the testing season. Results of the study are scheduled for publication during 1957.

### Norton Co.—Atlanta

**Norman R. Ekholm** has been appointed manager of the new Atlanta, Georgia, district office of the **Norton Company**, a leading supplier of grinding wheels and abrasive products. Mr. Ekholm joined Norton in 1935 and has been an abrasive engineer on the West Coast since 1946.

### Rockwell Purchases Republic Flow Meters

**Rockwell Manufacturing Company** has acquired the assets of **Republic Flow Meters Company** of Chicago.

Republic manufactures electronic and pneumatic instruments and process control equipment for the automatic measurement and control of flow for the electrical, petroleum, natural gas, steel and chemical industries, among others. Republic manufacturing operations are centralized at Chicago, with sales offices or branches maintained throughout the country.

Present management of Republic will remain unchanged with **James D. Cunningham**, founder of the company and one of Chicago's leading industrialists, continuing as president. **W. F. Crawford**, president of **Edward Valves Inc.**, a Rockwell subsidiary, will be associated with the Republic management in Chicago.

Republic's Chicago facilities will bring the total number of Rockwell manufacturing plants to 23.

### Johns-Manville — Southwest

**Jack E. Hesse** has been appointed Manager of the new **Johns-Manville Transite** asbestos-cement pipe plant now under construction at **Denison, Texas**.

### Carrier & Elliott Merge

The Board of Directors of **Carrier Corporation** and the Board of Directors of **Elliott Company** have agreed upon the basis whereby Elliott will be merged into Carrier. This announcement has been made by **Cloud Wampler**, chairman of the board of Carrier, and **William A. Elliott**, president of Elliott.

Elliott Company, whose executive offices are in Jeannette, Pennsylvania, is a leading manufacturer of steam turbines, electrical equipment, heat transfer apparatus, industrial process equipment including power recovery gas turbines, centrifugal compressors and expanders and turbo-chargers.

Carrier Corporation, with headquarters in Syracuse, New York, is the largest factor in the air conditioning and industrial refrigeration business and a substantial user of various types of equipment manufactured by Elliott Company.

(Continued on Page 22)

# REPUBLIC

announces a  
**double break-through**  
in pneumatic transmitter rangeability!

- Null-balance-vector design permits 20-to-1 range adjustment without re-setting zero!
- Suppression of range lower limit simply adjusted up to 50% of span!
- New compactness and weight saving solve most location problems.
- Low air consumption.
- Simplified, accessible mechanism for quick and easy servicing.

Republic has *literally* figured all the angles to bring you this new "family" of pneumatic transmitters for pressure and differential pressure. The null-balance-vector units are compact, easy to install and adjust, and permit range changes far beyond any pneumatic instruments previously available to industry—and *without changing* parts. You need only a screwdriver and reference gauge to change either the upper or lower range limit!

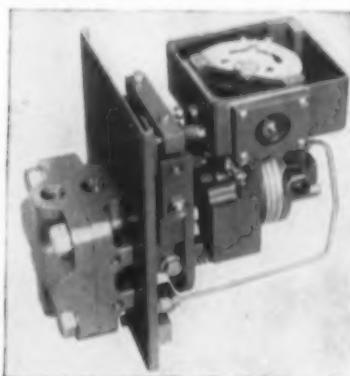
Adjustment time is radically cut since re-zeroing of the instrument is seldom needed when the upper range limit is changed. Unusually large changes in plant operating conditions can be accommodated quickly and without new or modified equipment, simply by loosening a set screw and moving one linkage component.

Republic Type VP and VDP pneumatic transmitters normally provide standard 3-15 psi output signal pressures. Air consumption is only 0.2 scfm since air flow virtually stops as soon as the transmitter balances each input signal



## TYPE VP

Pressure Transmitter  
Standard Ranges  
0-150 to 0-4000 psi  
0-60" H<sub>2</sub>O to 0-150 psi  
0-1½" to 0-60" H<sub>2</sub>O



## TYPE VDP

Differential Transmitter  
Standard Range  
0-15 to 0-300" H<sub>2</sub>O

change. And all Republic null-balance-vector instruments have top sensitivity and stability. Lightweight tension members in the balancing linkage respond quickly to pressure or differential changes and do not overshoot or "hunt" the balance point.

Whether your plant conditions change frequently or you just want the best sensitivity, accuracy and reliability available in pneumatic transmitters, you should get the full details on Republic Type VP and VDP transmitters.

WRITE FOR REPUBLIC FOLIOS NO. 56-12  
AND 56-13A TODAY...and keep an eye  
on Republic for new developments "in the  
works" now to help you with your most  
critical operating instrument problems.

## REPUBLIC FLOW METERS CO.

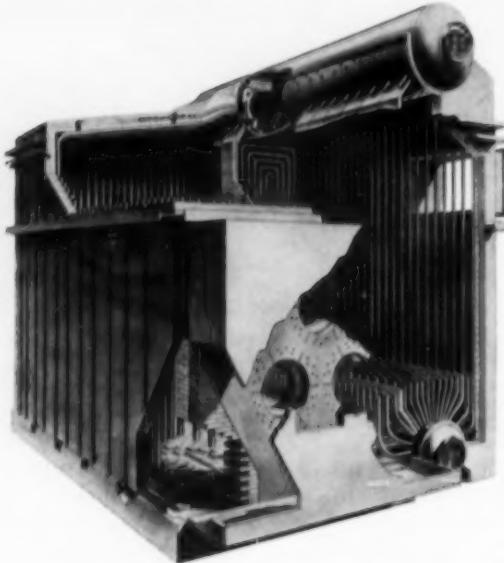
A Subsidiary of Rockwell Manufacturing Company  
2240 Diversey Parkway

Chicago 47, Illinois

Here's why you get  
**IMPORTANT SAVINGS** in

- ✓ *first cost*
- ✓ *installation*
- ✓ *operation*
- ✓ *maintenance*

with the  Series "SC" STANDARD BOILER



THESE nine Foster Wheeler design features add up to substantial savings in the cost of steam generation. Equally important is the extra *dependability* that's built into every "SC" unit — the result of over 60 years of experience in the design and construction of large, high-pressure steam generators for leading central station power plants.

Pre-engineered in all details and standardized for economy, these FW standard steam generators are available for oil or gas firing, in capacities from 50,000 to 150,000 lb/hr, for pressures to 1500 psi and superheated steam temperatures to 950 F. For complete information, send for Bulletin B-55-4. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

**FOSTER WHEELER**

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

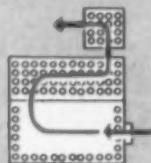
**1. COMPLETELY WATER-COOLED WALLS**

All furnace walls are cooled by closely-spaced tubes, minimizing scaling, maintenance and preventing excessive exit gas temperatures.



**2. EFFICIENT FIRING ARRANGEMENT**

Burner arrangement assures maximum rating without overheating furnace tubes. Rear wall is over 19 ft. from burner wall, permitting long, horizontal flame travel.



**3. FULLY DRAINABLE SUPERHEATER**

A completely drainable superheater permits removal of all condensed water from the elements before start-up.



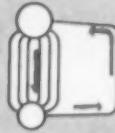
**4. HIGH STEAM PURITY**

The normal drum internals consist of chevron dryers and a dry box. Separators may be added which make possible a steam purity of 1PPM or less.



**5. UNRESTRICTED CIRCULATION**

Absence of headers provides free circulation through integral risers and downcomers, eliminating header handhole plates and gaskets.



**6. BOTTOM SUPPORTED UNIT**

The bottom-supported design fully utilizes the structural strength of the tubes and provides low unit stresses in all members.



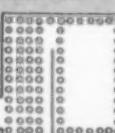
**7. PRESSURE-TIGHT CASING**

The all-welded casing forms a rigid, pressure-tight unit that can be arranged for pressurized or balanced draft operation.



**8. MINIMUM REFRactory BAFFLING**

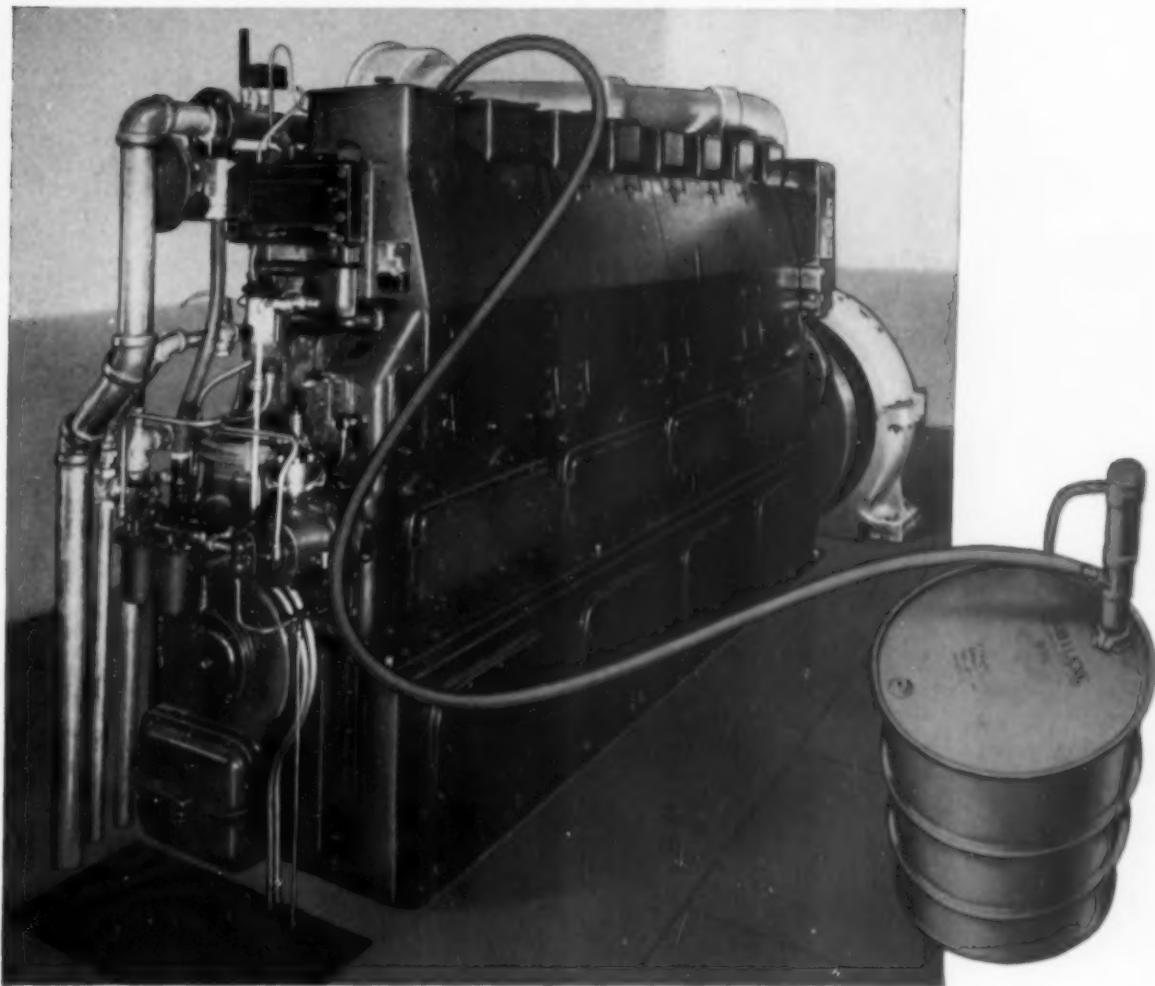
The wall separating furnace and boiler bank is the only refractory baffling used. It is completely accessible from the furnace.



**9. SIMPLE SOOT BLOWER ARRANGEMENT**

Soot blowers are supported on the outer row of boiler-bank tubes, simplifying alignment and providing easy access.





# Stops Thin-Out!

You can protect your Diesel against wear due to excessive thin-out of the lubricating oil at higher operating temperatures. Switch to Sinclair RUBILENE®, the high viscosity index oil proved by over 35 years in a wide variety of Diesel applications. You'll find RUBILENE holds its high film strength and reduces oil consumption . . . gives you better protection of cylinders, pistons, rings and other vital moving parts operating continuously for long periods. Your Diesel logs more full-power hours!

Switch now to RUBILENE. Regardless of the make of your Diesel, there's a member of Sinclair's famous RUBILENE or RUBILENE HD family that meets your needs exactly! Call your local Sinclair Representative or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation!*

**SINCLAIR**

**RUBILENE OILS**



# \$90,000,000 Idlewild expansion program uses 1515 tons of GILSULATE to protect 7 miles of pipe

New York International Airport Has One of World's Largest High Temperature Hot Water Systems

By 1960 "Terminal City" will be a completed reality at New York International Airport. This gigantic undertaking comprises 655 acres and will be equipped to handle 140 aircraft at one time. Estimated cost of the project is \$90,000,000.

Running from a central heating plant to each of the projected buildings in Terminal City is one of the world's largest non-military high temperature hot water systems ever designed. This system, operating at 380°F on the supply and 240°F on the return lines, includes 38,774 feet of pipe (7.34 miles!), virtually all of which is protected with 1515 tons of Type B GILSULATE. In this gigantic system, expansion loops alone total almost one mile!

Big job or small job, GILSULATE offers the same unique protection for

underground hot pipes—and the same opportunity for on-the-job savings. GILSULATE is easy to install; it calls for no trained fitters or applicators, no special installing equipment. So whether *your* piping job is large or small, you'll find that GILSULATE fits right into your specification picture—at a lower cost per installed linear foot than any other underground hot pipe insulation.

For more complete information, see your local GILSULATE distributor, or write any of our offices listed below.

## AMERICAN GILSONITE COMPANY SALT LAKE CITY 1, UTAH

Affiliate of Barber Oil Corp. & Standard Oil Co. of Cal.  
OFFICES AT: 134 West Broadway, Salt Lake City, Utah  
The Agents Building, 3537 Lee Road, Cleveland 20, O.

Do you receive PIPE INSULATION NEWS? Ask to be put on our mailing list.

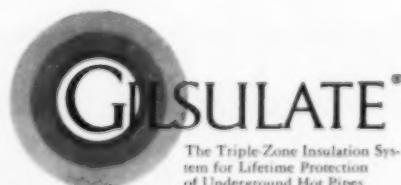
LARGE TRENCH AT IDLEWILD shows one expansion loop in foreground and another in background. Note large pipes for chilled water lines running outside of the walled trench containing the high temperature hot water system. The control tower is in the center of the photograph, and the new International Arrival Building is at the right of the tower. The bags of GILSULATE are slid down boards into the trench.



Artist's sketch of Terminal City showing proposed buildings and extent of high temperature hot water system.

### FACTS ABOUT GILSULATE

1. **EASY TO USE**—just pour and tamp... pipe heat does the rest.
2. **FORMS 3 ZONES** of protection against heat loss and all hazards commonly encountered by buried hot pipes.
3. **NEEDS NO HOUSING OR MECHANICAL SHEATHS**: no mixing, special handling or equipment.
4. **ONLY NEEDS NORMAL PIPE SPACING**: for multiple pipe or cramped conditions.
5. **THREE TYPES AVAILABLE**:  
Type A for 220°-300°F. temp. range  
Type B for 300°-385°F. temp. range  
Type C for 385°-520°F. temp. range



The Triple-Zone Insulation System for Lifetime Protection of Underground Hot Pipes



## World's First Supercritical Double-Reheat Steam Turbine Installed at Philo Plant

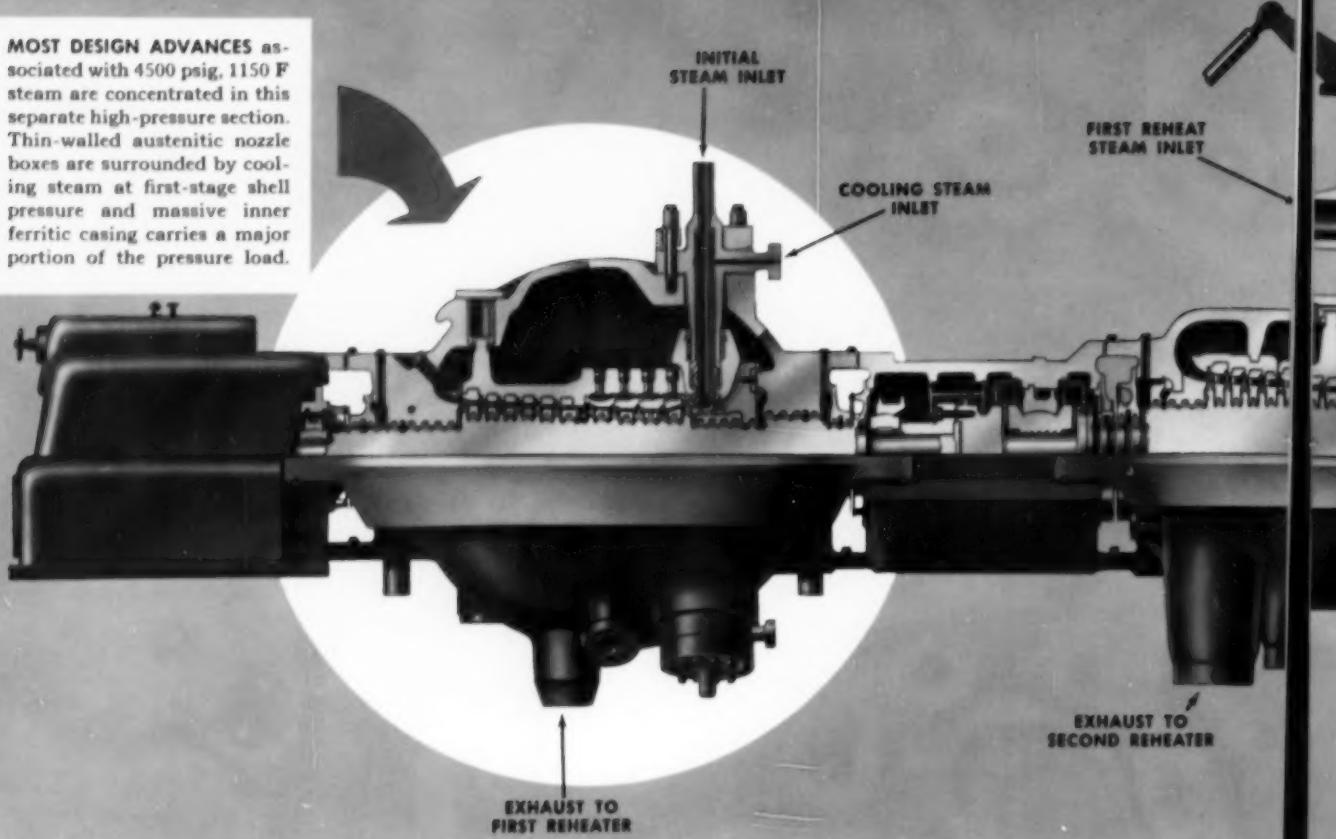
New 125,000-kw General Electric unit at Philo Plant of Ohio Power Company marks another milestone of progress in the development of more economical electric power production through higher initial steam conditions.

*Progress Is Our Most Important Product*

**GENERAL**  **ELECTRIC**

FOR DETAILS, TURN TO NEXT THREE PAGES

**MOST DESIGN ADVANCES** associated with 4500 psig, 1150 F steam are concentrated in this separate high-pressure section. Thin-walled austenitic nozzle boxes are surrounded by cooling steam at first-stage shell pressure and massive inner ferritic casing carries a major portion of the pressure load.



## Higher pressures and temperatures operate through double-reheat cycle to raise fuel economy

New unit will run at 4500 psig, 1150 F initial temperature, with 1050 F first reheat and 1000 F second reheat

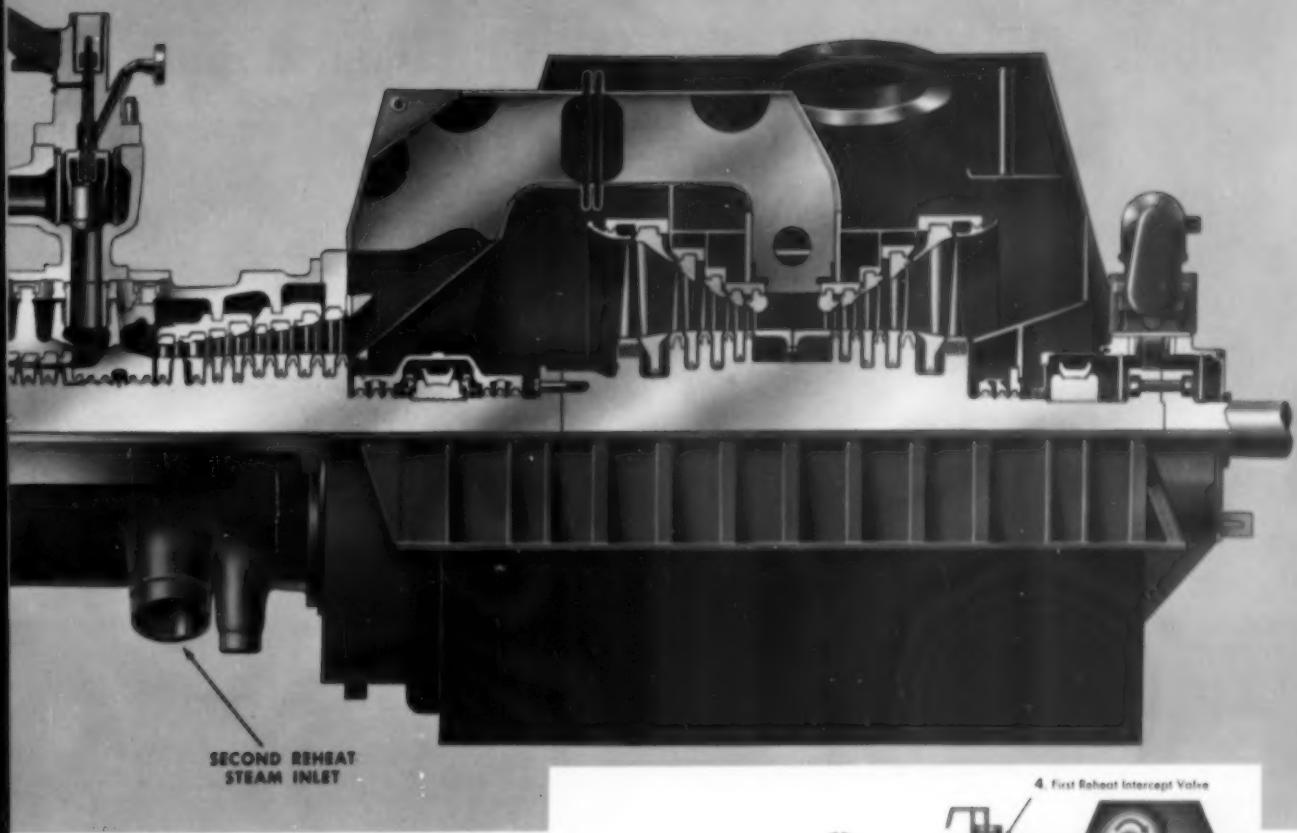
The Ohio Power Company's Philo Plant, one of the key generating units of the American Gas & Electric Company's system, has become the site of another significant advance in electric power generation. It will be the first station to generate commercial electric power from a turbine-generator operating at the supercritical pressure of 4500 psig—almost double the highest pressure used to date. Its initial steam temperature of 1150 F is 50° greater than the previous high of 1100 F reached only three years ago.

These advanced steam conditions, coupled with the first application of the double reheat cycle, can increase thermal efficiency 5% over the most efficient steam plant now in operation.

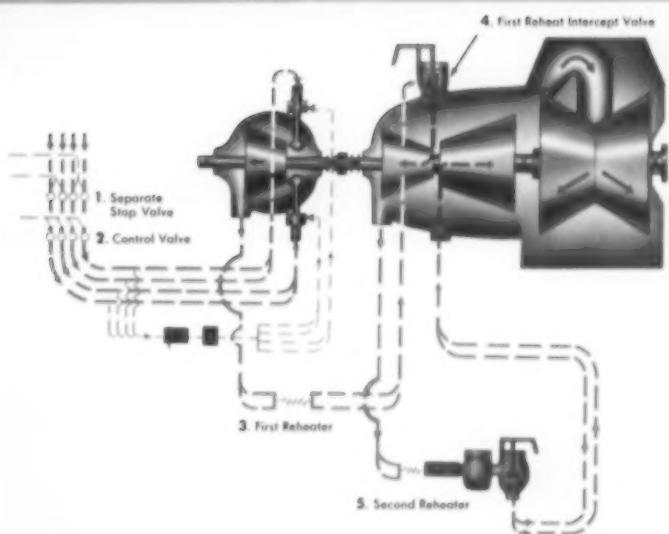
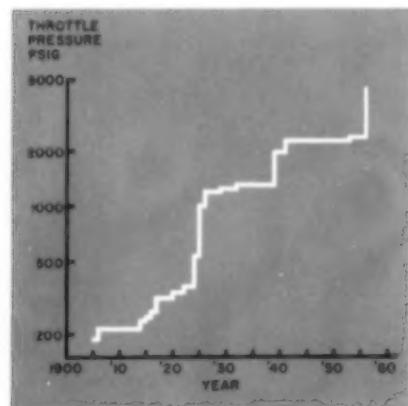
**ONE OF THE MAJOR PROBLEMS** General Electric designers had to overcome was the danger of thermal distortion of thick austenitic castings and forgings. So austenitic steel parts were made as thin as pos-

sible by use of 1) a steam cooling arrangement which permits the use of thin-walled austenitic sections with low temperature gradients and reduced susceptibility to distortion, 2) individual control valve bodies of small diameter and consequently thinner walls, 3) multiple steam pipes with individual turbine stop valves placed in each line, and 4) simple throttling control with full 360-degree arc admission to the first stage nozzles.

**THE EXPERIENCE GAINED** and new ideas developed during the design and manufacture of this first supercritical-pressure steam turbine are already being applied to the study of larger units for even more economical operation. The Philo turbine may well mark a turning point in the history of steam power generation. For more details, write for Bulletin GER-1130, Large Steam Turbine-Generator Department, General Electric Co., Schenectady 5, New York.



**Progress in increasing throttle steam pressure over the past 50 years.** The new advance to 4500 psig represents the first major step upwards since a maximum of 2300 psig was achieved in the early 1940's.



**SUPERCritical STEAM ENTERS THE TURBINE** through four main steam pipes. Each pipe has a separate stop valve (1) and control valve (2) located below the turbine room floor. Steam exhausts at 800 F to first reheater (3). Here it is reheated to 1050 F and enters center of intermediate turbine through first intercept reheat valve (4). Then it expands through nine stages toward middle standard and exhausts to second reheater (5) at approximately 207 psig, 600 F. Steam leaves reheat at 1000 F to re-enter remaining portion of intermediate section, passes through crossover, and expands to condenser through double-flow, low pressure turbine.

**GENERAL**  **ELECTRIC**

# Building a 4500 psig supercritical steam turbine...



**1 CASTING COMES IN:** Lower half of massive cast ferritic outer casing for high-pressure section is delivered. Spherical shape helps minimize stress and enables casing to withstand operating pressures.



**2 MACHINING OF CASTING** is done with extreme accuracy. Prior to machining, casting was thoroughly checked for internal flaws by 15-million-volt betatron, which can "see" through more than a foot of steel.



**3 ROTOR IS MACHINED** from a solid forging of Type 347 steel, then heat treated to remove stresses. An alternate steam-cooled ferritic rotor is also being supplied for further developmental studies.



**4 ROTOR IS INSPECTED** after final assembly. First stage buckets are only about  $\frac{3}{8}$  in. long, with multiple-hook dovetails designed to take care of differences in thermal expansion between rotor and buckets.

154 31

5 TURBINE IS ASSEMBLED as high-pressure rotor is lowered into lower half of shell. High temperatures and pressures necessitated several unique innovations in design of diaphragms and other parts.

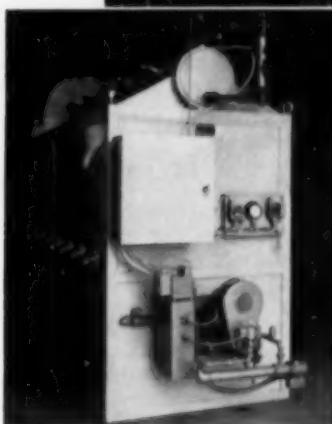
6 FINAL ASSEMBLY is culmination of months of designing, manufacture and exhaustive testing of individual components. Operating at 4500 psig, this unit will help evaluate the use of supercritical steam.

154 31

Leader in Turbine-Generator Progress

GENERAL  ELECTRIC

**"Built-in" RESERVE STEAM of QC Boiler  
works 'round the clock  
for Dantzler Lumber Co.!**



*Dantzler Lumber & Export Co., Jacksonville, Fla.  
Interior of pressure-treating plant showing Queen City Boiler*

### **100 hp QC Boiler delivers needed temperature rise in required time for maximum production**

That, in a nutshell, is the story of the high efficiency of the Queen City water tube boiler working for the Dantzler Lumber & Export Co. in Jacksonville, Fla.

Dantzler operates one of the most modern and well-equipped wood preserving plants in the country. Dantzler says the 100 hp Queen City water tube boiler is a "near relative to the electronic brain" due to the automatic controls which precisely adjust

the supply of fuel and water as required . . . and which delivers full steam pressure fast, as needed, 'round the clock!

Install a Q C "bent tube" water tube boiler in your plant. No matter what the fuel . . . oil, gas, coal, combination gas-oil . . . Queen City boilers give you more steam, faster and drier, for less cost! Available from 300 to 17,500 lbs/steam/hr, up to 250 psi.

Highly efficient  
**QUEEN CITY  
WATER TUBE  
BOILERS**

are saving money  
right now  
for many plants in  
many industries!



*For complete information, write*

**Queen City  
Engineering Co.**

P. O. Box 3103 CHARLOTTE • NORTH CAROLINA

## News (Continued)

### Corrulux Div. — Texas

Eugene Sinnett has been appointed General Manager of the Corrulux Division of the L.O.F. Glass Fibers Company, according to T. A. Collins, Vice President, General Manager, Eastern Division.

Previously, Mr. Sinnett was the Plant Manager of the Corrulux Division. James L. Neill, formerly the division controller, succeeds Mr. Sinnett as Plant Manager.

Mr. Sinnett has a record of over 30 years in the glass industry. In 1926, he joined the Vitrolite Company, Parkersburg, West Virginia, as an hourly employee and was later promoted to salaried payroll as an engineering detail draftsman. He became assistant to the master mechanic in 1948.

Associated with the Plate Construction Company from 1949 to 1951, he joined Libbey-Owens-Ford Glass Company's Fiber Glass Division in April 1951. This division became a part of L.O.F. Glass Fibers in early 1955 and Mr. Sinnett was promoted to Plant Production Superintendent at the company's plant in Parkersburg, West Virginia. He became Plant Manager of the Corrulux Division in 1956.

### Jack Warner President of Gulf States Paper

At a recent meeting of the board of directors, Jack W. Warner was



elected president of Gulf States Paper Corporation, Tuscaloosa, Alabama. He succeeds Mrs. Mildred W. Warner. Mr. Warner was formerly executive vice president and treasurer.

(Continued on Page 34)

# Dependable as "Old Faithful"

### LUBRICATION

### AGAINST

### 50,000 P.S.I.G.

### MANZEL LUBRICATORS

are designed to safeguard your expensive machinery with positive force feed lubrication. Choice of models to meet any need, with fully adjustable pumping rate. Experienced field engineers available for consultation at any time.

WRITE FOR  
COMPLETE  
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LUBRICATORS • CHEMICAL FEEDERS • SLURRY PUMPS

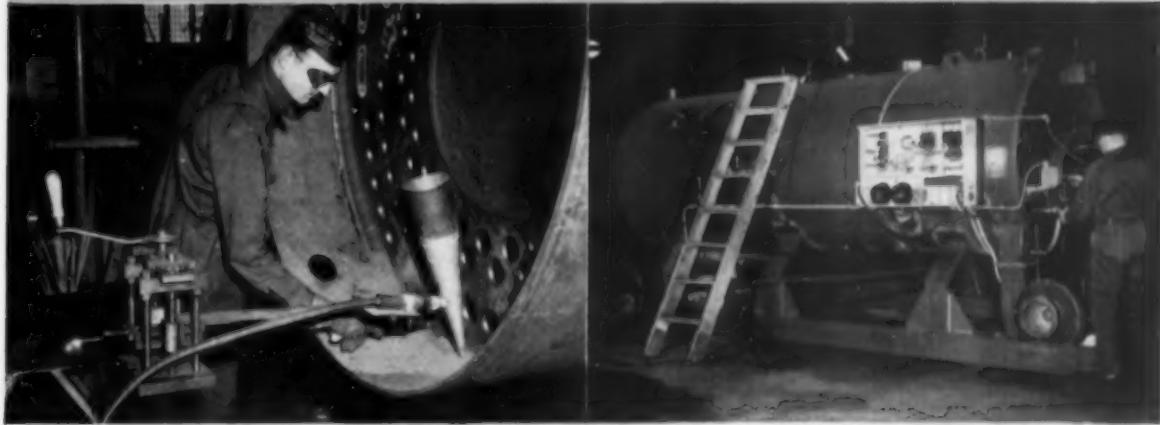
518 BROAD STREET • BUFFALO 10, NEW YORK

A Division of Hordalite Industries, Inc.

# AMESTEAM GENERATOR



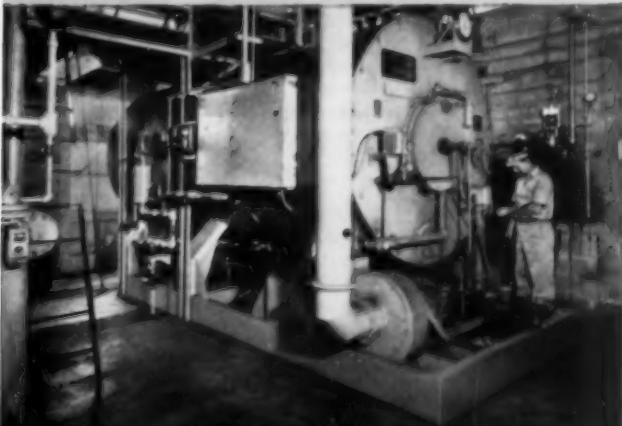
## Gives you EXTRA YEARS of SERVICE



### CONSTRUCTION THAT EXCEEDS CODE

**REQUIREMENTS** goes into every step in the making of an AMESTEAM GENERATOR. Here, the tube sheet is automatically welded to the shell. Tubes are rolled and *re-rolled* after stress-relieving to insure an absolutely tight sheet and long life. The insulation jacket is 16-gauge, not the usual 24-gauge.

"**FINAL EXAMINATION**" which every AMESTEAM GENERATOR must pass is the fire test under conditions duplicating those of the customer's operation. All component parts are specifically designed and fabricated for AMESTEAM GENERATORS — assembled, inspected and tested in the Ames factory, not merely purchased and shipped from one point.



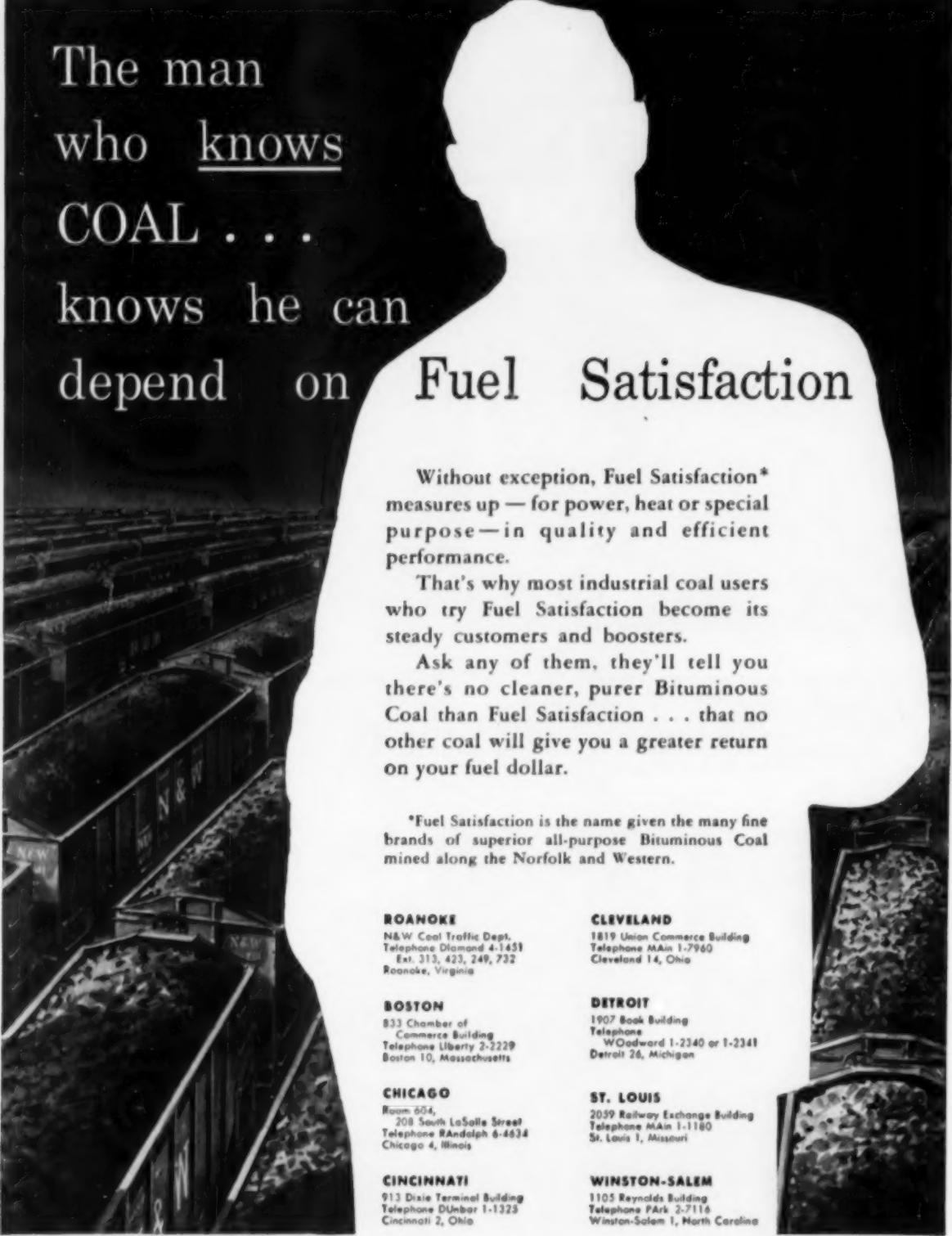
### STRENGTH FOR THE YEARS AHEAD!

Your AMESTEAM GENERATOR is shipped in firing condition with an inbuilt bonus of durability and performance beyond standard boiler requirements. Note rugged construction of every component from skids to steam outlet — Ames "extras" that provide support and protection for the boiler during shipment and years of operation.

### — PLUS EVERY OTHER FEATURE FOR RELIABLE, LOW-COST STEAM

Most important to the user is the Ames 3-pass concentric tube design — inherently efficient and simple to maintain — free of the ill effects of thermal expansion and contraction encountered in most other boilers. The maximum flexibility of the tube sheets in AMESTEAM GENERATORS occurs at the point of maximum expansion, while minimum flexibility occurs at the point of minimum expansion — a vital protection against untimely metal fatigue. Just one of many reasons why you're safe and sure when you specify "AMESTEAM GENERATOR". Write for catalog and name of your nearby Ames sales and service representative.

**AMES** IRON  
WORKS INC.  
BOX L-67 OSWEGO, N. Y.



# The man who knows COAL . . . knows he can depend on Fuel Satisfaction

Without exception, Fuel Satisfaction\* measures up — for power, heat or special purpose—in quality and efficient performance.

That's why most industrial coal users who try Fuel Satisfaction become its steady customers and boosters.

Ask any of them, they'll tell you there's no cleaner, purer Bituminous Coal than Fuel Satisfaction . . . that no other coal will give you a greater return on your fuel dollar.

\*Fuel Satisfaction is the name given the many fine brands of superior all-purpose Bituminous Coal mined along the Norfolk and Western.

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N&W Coal Traffic Dept.  
Telephone Diamond 4-1451  
Ext. 313, 423, 249, 732  
Roanoke, Virginia

#### BOSTON

833 Chamber of  
Commerce Building  
Telephone Liberty 2-2229  
Boston 10, Massachusetts

#### CHICAGO

Room 604,  
208 South LaSalle Street  
Telephone Randolph 6-4634  
Chicago 4, Illinois

#### CINCINNATI

913 Dixie Terminal Building  
Telephone DUMbar 1-1325  
Cincinnati 2, Ohio

#### CLEVELAND

1819 Union Commerce Building  
Telephone MAin 1-7960  
Cleveland 14, Ohio

#### DETROIT

1907 Book Building  
Telephone  
WOodward 1-2340 or 1-2341  
Detroit 26, Michigan

#### ST. LOUIS

2059 Railway Exchange Building  
Telephone MAin 1-1180  
St. Louis 1, Missouri

#### WINSTON-SALEM

1105 Reynolds Building  
Telephone PARK 2-7116  
Winston-Salem 1, North Carolina

## *Norfolk and Western Railway*

CARRIER OF FUEL SATISFACTION



New lithium base

## **GULFCROWN GREASE**

**...the one grease that does the work of many**

It's a fact—you can use Gulfcrown practically anywhere! On plain or anti-friction bearings. In gear boxes. Outside or inside. You name it, chances are Gulfcrown will lubricate it—but good! Operating conditions can be hot, cold or wet . . . this tough, all-purpose grease does its job regardless.

You can see how one multi-purpose grease that does the work of many is a big money-

saver. It reduces inventory, cuts lubricating costs and prevents application errors. Check the saving yourself—test Gulfcrown. Ask your Gulf sales engineer or write for free literature.

**GULF OIL CORPORATION**  
1822 Gulf Building  
Pittsburgh 30, Pa.

**THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS**



# ALGAE CONTROLLED IN 20-MILE CANAL with PHYGON-XL



In a large canal in California\*, delivering 28,800 gallons of water per minute, filamentous algae is controlled by a water suspension of Phygon®-XL. On the 11th day following treatment, for example, the first 10 miles of the canal were clear of algae, while the remaining 10 miles had only short algae. Phygon keeps the upper hand at all times.

In all parts of the country, you will find that

Phygon-XL has been determined by usage and test to be the least expensive, *most* effective algicide for lakes, ponds, reservoirs and industrial water recirculating systems. Harmless to humans and mammals.

Order Phygon-XL from your local supplier today. Write, wire or phone us if unable to locate immediate source of supply.

\*From our correspondence files



**United States Rubber**  
**Naugatuck Chemical Division**  
**Naugatuck, Connecticut**

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

# See them Now!

Industry's  
**MOST WANTED**  
line of  
**GENERAL PURPOSE VALVES**

FOR PETROLEUM REFINERIES  
CHEMICAL PLANTS • POWER PLANTS

**MOST WANTED** — that's right — because the G P line includes gate, globe, and angle type valves having seats faced with **HAYNES STELLITE\*** alloy or other hard facing alloys for greater seat-wear resistance . . . at no extra cost!

Hard faced seats, in combination with precision finished, selectively hardened discs and wedges give these valves amazing resistance to erosion, corrosion

**Write for Supplement No. 1  
to Catalog F-9**  
Address Dept. 24A-FS

and galling. That's why they are setting new standards of performance in steam, water, oil, or gas services at the recommended pressures and temperatures.

Get longer, drop-tight, service life with minimum maintenance by specifying Vogt G P Valves. Available in a complete range of sizes from  $1/4"$  to  $2"$  and rated 800 pounds at  $850^{\circ}\text{F}$ . and 2000 pounds at  $100^{\circ}\text{F}$ .

**HENRY VOGT MACHINE CO.**  
P. O. Box 1918 — Louisville 1, Ky.

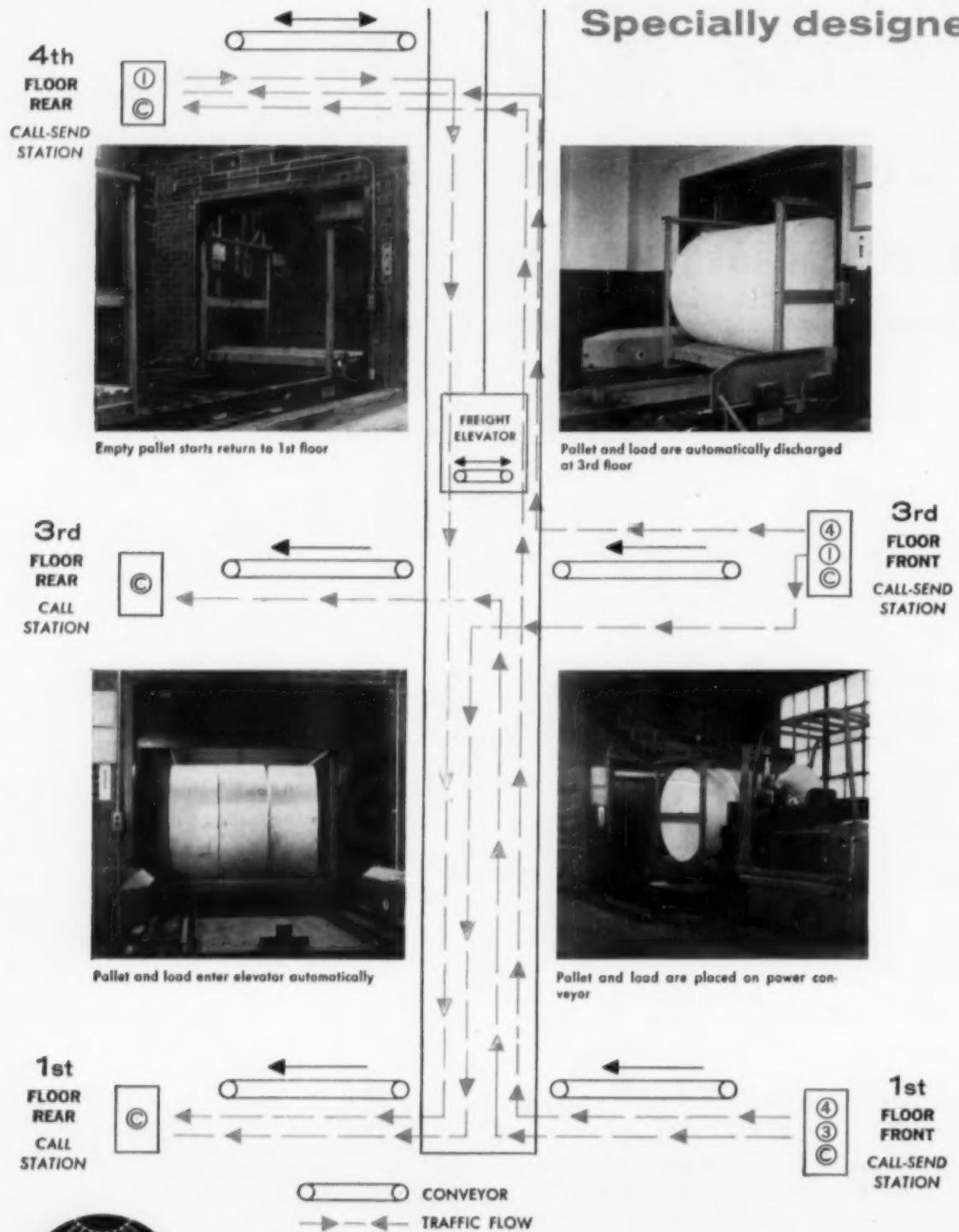
SALES OFFICES: New York, Chicago, Cleveland, Dallas, Philadelphia, St. Louis, Charleston, W. Va., Cincinnati,

**DROP FORGED STEEL**

**VALVES**

\*Trade-Mark of Union Carbide and Carbon Corporation

## Specially designed



# freight elevator

"ENGINEERED SERVICE BY THE MAKER"

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

# 'Call-and-Send' system handles multi-floor freight automatically

OTIS and the Alvey Conveyor Company developed the special materials handling system illustrated and explained at the left. Power-operated conveyors serve as the elevator platform and the floor landings. Light-ray devices coordinate freight movement and elevator door operation.

This 'Call-and-Send' system was developed for the INDIVIDUAL DRINKING CUP COMPANY, a subsidiary of Dixie Cup Company in Easton, Penna.

OTIS is very much interested in helping to develop automatic materials handling systems.

Further, OTIS is able to assure the uninterrupted operation of these systems by providing OTIS Maintenance. The elevators in the 'Call-and-Send' system, five other freight elevators and one passenger elevator, all by OTIS, have been under OTIS Maintenance for a total of 60 years and are still operating at their original efficiency. The life of these elevators is being constantly extended indefinitely by checking and replacing all wearing parts in advance of their breakdown point. This prevents production losses. With OTIS Maintenance there's just one fixed monthly charge. This prevents unexpected, expensive repair bills. Basically OTIS Maintenance is designed to keep elevators running like new on a fixed budget basis.

## Only Otis Maintenance offers these advantages to owners of Otis Freight Elevators

- "Engineered Service" by the maker maintains the original efficiency of the installation and assures peak performance at all times.
- Services of factory-and-field trained men with a knowledge of elevating that can't be matched.
- Availability of original or improved replacement parts for every installation, regardless of its age.
- Freedom from unexpected, expensive repair bills. There's just one fixed monthly charge. It can be budgeted. It's adjusted annually, up or down, on labor and material costs only. Never because of the age or condition of the equipment.
- Guarantees of the maker's high standards of safety through the constant checking and replacing of parts in advance of their breakdown point.**
- Elimination of all guesswork in testing and repairing by using specially designed tools and electronic equipment to minimize shutdowns.**
- Systematic upkeep and replacement of parts extends the life of an installation indefinitely.**
- The value of a maker's pride. A perfectly performing Otis installation is Otis' best salesman. That's why we're never satisfied with anything less than peak performance at all times.**



Baker Trucks with a paper-roll grab on a 360° revolving head can pick up, carry and stack rolls in any position.

**Baker®**  
Industrial trucks

The Baker-Bouleng Company, an Otis subsidiary, is the maker of Baker Gas and Electric Industrial Trucks.

## maintenance

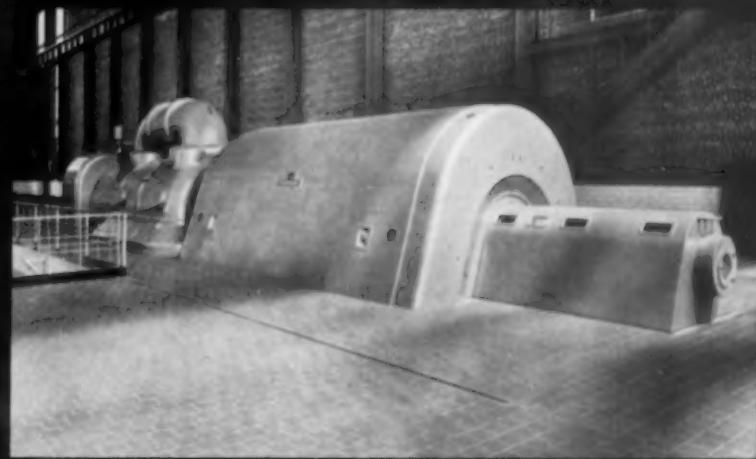
that keeps freight elevators running like new

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA



Westinghouse Preventive Maintenance at Alabama Power Company

**FROM COIL ORDER  
TO COMPLETED REWIND  
IN 4 WEEKS**



This rewound generator, back in service at the Gadsden Steam Plant, is another reason why Alabama Power has long recognized the value of their Preventive Maintenance program.

Westinghouse Preventive Maintenance Inspection Service serves Alabama Power Company, again. When Westinghouse field engineers inspected this 60,000-kw generator in February, 1957, during scheduled overhaul of the generating unit, they found conditions which led to a decision to rewind it during the outage then in progress. Westinghouse was ready with men and materials to do the job.

Alabama Power stated the unit couldn't be out of service for more than 5 weeks, or they would suffer additional loss. Westinghouse alerted its personnel, ordered the coils and started working 20 hours a day,

6 days a week, to strip and rewind. The job was completed March 14th, 28 days after the customer order was given.

Skilled, highly trained Westinghouse field personnel will perform preventive maintenance inspection, on-the-spot repairs and modernization to keep your electric apparatus operating at peak efficiency. Nationwide, they are on call 24 hours a day with fast, reliable service.

Contact your Westinghouse salesman, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-96183

**YOU CAN BE SURE...IF IT'S Westinghouse**





## NO JOB TOO BIG... NO JOB TOO SMALL!



## PREFABRICATED PIPING BY GRINNELL...

**QUALITY** — Delivery of prefabricated piping sub-assemblies to exacting engineering standards which meet all governing code requirements is assured by Grinnell's Quality Control, which includes:

Interpretative engineering; metallurgical research; specialized facilities; skilled personnel; rigid inspection.

**ECONOMY** of specifying Grinnell prefabricated piping results from:

One source for design, interpretation, and fabrication; coordination of shop production under ideal conditions; elimination of waste by paying only for finished material delivered; reduction in field erection time.

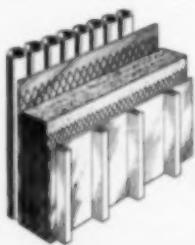
**INCLUDED IN PRICE** (which is determined in advance) are such items as: interpretation of fabrication needs, shop sketches and planning, procurement of materials, power services, expendable tools and supplies. There are no charges for spoilage. All prefabricated piping is rigidly inspected and tested to comply exactly with customer specifications.

**GRINNELL**  
WHENEVER PIPING IS INVOLVED



Grinnell Company, Inc., Providence, Rhode Island

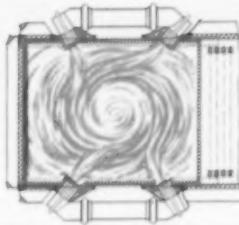
Coast-to-Coast Network of Branch Warehouses and Distributors  
pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves  
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies  
Industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems



**DOUBLE WALL, PRESSURE-TIGHT CASING.** The latest development in casing construction for pressure firing of boilers in the size class of the VU-55, this casing is designed to assure life-time tightness with minimum heat loss. Pressure firing permits the elimination of an induced draft fan with its attendant operating and maintenance costs. Construction consists of tangent tubes backed up successively by welded steel panels, 4 inches of high quality insulating material and an outer steel casing formed as shown to provide adequately for expansion and assure ample strength. Low heat loss and the tightness required for pressure firing are assured by this double-wall construction.

**TANGENT FURNACE TUBES.** The VU-55's furnace tube arrangement provides complete heat-absorbing, water-cooled protection on all furnace walls. Furnace maintenance is minimized, refractory expense is eliminated, heat absorption rates per sq. ft. are higher.

**TANGENTIAL FIRING.** More than 20 years of application experience have established the exceptional advantages of tangential firing. About 90 per cent of Combustion's large utility installations use this advanced method of firing. Flame streams from the four burners impinge upon one another at high velocity, as shown, creating a turbulence unattainable by any other method of firing. The result is rapid and complete combustion. As the gases spiral upward, they sweep all furnace heating surfaces, assuring a high rate of heat absorption.



**HIGH STEAM QUALITY.** Equipped with a large (60-in.) steam drum, the VU-55 has generous water capacity and steam reservoir space. C-E drum internals assure high quality steam at all ratings.



## Custom Features, Standard Sizes, Advanced Design

The VU-55, newest of the C-E line of Vertical Unit Boilers, represents the closest approach to central station performance yet achieved in standardized boilers in its capacity range.

Its design combines a number of time-tested and service-proved features, such as Tangential Burners, double wall, pressure-tight casing, and tangent furnace tubes. In addition, this bottom-supported unit requires no outside supporting steel, is economical of space and streamlined in appearance.

It is available in 5 sizes for capacities from 50,000 to 120,000 lb per hour. It is designed for 3 pressure ranges (250, 500 and 750 psi) and can be equipped with a superheater to provide temperatures up to 750 F. Either a tubular or a regenerative air heater is available.

The VU-55 Boiler is symmetrical in design, performs efficiently over a wide range of output, and is easy to operate and maintain.

It is, in fact, the boiler with the custom features and the advanced design.

## COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N.Y.

Canada: Combustion Engineering-Superheater Ltd.



B-975A

all types of steam generating, fuel burning and related equipment; nuclear reactors; paper mill equipment; pulverizers; flash drying systems; pressure vessels; soil pipe.

the  
powerful  
answer  
to your  
liquid  
handling  
problems



**INGERSOLL-RAND**  
**MOTORPUMP**

When production lags because of inadequate pumping facilities, you need the dependable power of an Ingersoll-Rand Motorpump. These pumps are designed for deliveries of from 5 to 2800 gallons per minute, they operate in any position and being compact, save floor space as well!

I-R Motorpumps are efficiently designed for economical performance and ruggedly constructed to stay on the job with a minimum of maintenance.

To get all the details on I-R Motorpumps in sizes from  $\frac{1}{4}$  to 75 hp, write for complete catalog data.

**Ingersoll-Rand**

9-421

11 Broadway, New York 4, N. Y.

## News (Continued)



### Atwood & Morrill — N.O.

**Arthur C. Hays**, 1221 Carondelet Bldg., New Orleans, La., has been appointed sales representative for **Atwood & Morrill Company** in the New Orleans area.

Mr. Hays, an Auburn graduate, was with Allis-Chalmers in Atlanta, Georgia, before coming to New Orleans. He has been active in sales engineering work since 1930, representing first line companies in the Gulf Coast region.

Atwood and Morrill Co., designers and manufacturers of special valves for power plants, process systems, marine applications and special industrial problems, have their main offices and factory at Salem, Mass.

### U. S. Rubber — South & Southwest

**William J. Reddington** has been appointed St. Louis district sales manager for the mechanical goods division of **United States Rubber Co.**

Mr. Reddington replaces Hugh Reynolds, who retired February 1 after 30 years with the rubber company. Mr. Reynolds had been St. Louis district sales manager since 1944.

Mr. Reddington, a native of Passaic, N. J., has been with U. S. Rubber since 1933, and a member of its mechanical goods sales staff since 1937. In his new post he will be responsible for the sale of mechanical goods products, ranging from conveyor belting to chemically-resistant plastic pipe, in **Missouri**, **Arkansas** and sections of **Illinois**, **Indiana**, **Kentucky**, **Mississippi** and **Tennessee**.

(Continued on Page 36)

# DETROIT LoSTOKERS

## Efficiently Fire Small Boilers

AVAILABLE FOR EITHER FIREBOX OR  
BRICKSET APPLICATIONS . . .



Capacity Range 3,000 to

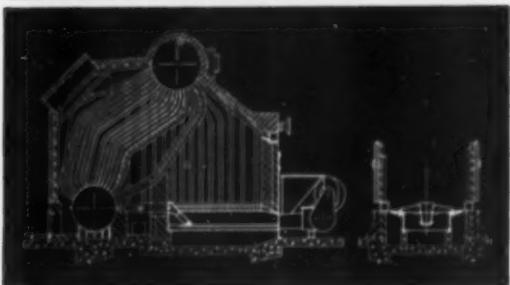
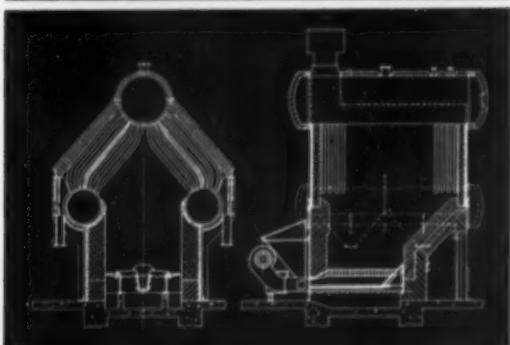
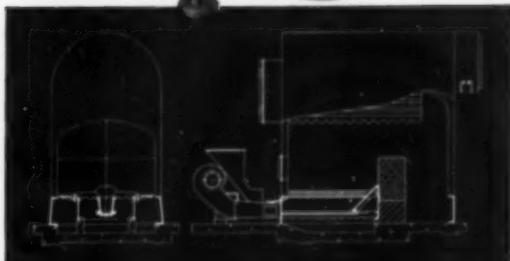
12,000 Pounds of Steam per Hour

Save Coal—Save Labor—Eliminate Smoke

← For Brickset  
Applications



For Firebox  
Applications



A complete mechanical firing unit. The Detroit LoStoker is efficient, dependable and built for long life. Requires little power for operation, may be driven either by motor or steam turbine, under automatic control.

Optional regulation is "Start and Stop" or "Full Floating Control". With "The Detroit Adjustable Feed Control", the plunger always operates on a full stroke, which assures uniform distribution at all capacities.

Where furnace volume permits, the LoStoker may be installed directly in firebox boilers, without front or side-wall brickwork.

Typical applications to small boilers are shown.

**WRITE FOR RECOMMENDATIONS • NO OBLIGATION**

**DETROIT STOKER COMPANY**

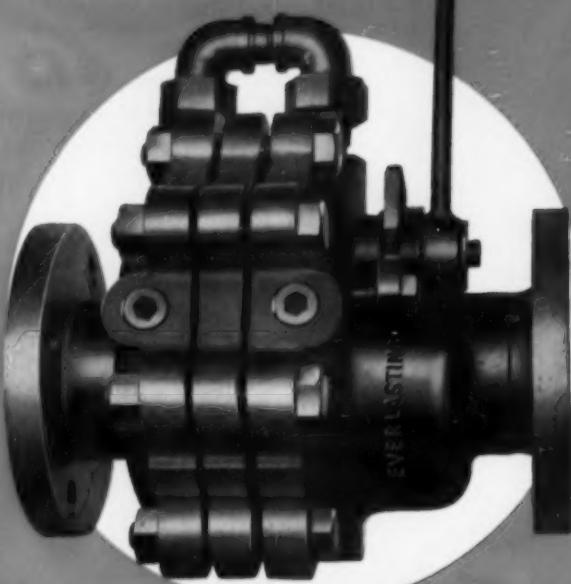
MAIN OFFICE AND WORKS • MONROE, MICHIGAN

District Offices or Representatives in Principal Cities

**SAVE COAL • SAVE LABOR • ELIMINATE SMOKE**

# VISCOSUS MATERIALS

Flow Freely



through

**Steam-Jacketed  
EVERLASTING Valves**



The EVERLASTING Steam-Jacketed Valve has proven outstandingly successful in handling many different kinds of viscous materials, such as tar, asphalt, pitch, paraffin, waxes, molten sulfur, etc.

Available in sizes 1 1/2 in. to 6 in. inclusive, in iron body for 125 psi and cast steel for 150 psi.

For further details, write for Bulletin E-200.

For "everlasting" service, use  
**EVERLASTING**  
*Valves*

EVERLASTING VALVE CO.  
53 FISH STREET, JERSEY CITY 5, N. J.

## News (Continued)

### Alvey Conveyor—Charlotte

A new district office has been established by the **Alvey Conveyor Manufacturing Company** at 1318 Berkeley Ave., **Charlotte, N. C.** New Southeastern office is under the direction of **L. D. Burdette**.

### G-E Welding—Ala.

A new warehouse and sales office has been established at 130 W. Finley Ave., **Birmingham, Ala.**, by **General Electric's Welding Department**. **I. F. Dorrell** is sales supervisor.

### Tube-Strut Sales Manager

William T. Bardouski has been appointed national sales manager of **Tube-Strut**, a division of **Tubular Structures Corporation of America**.

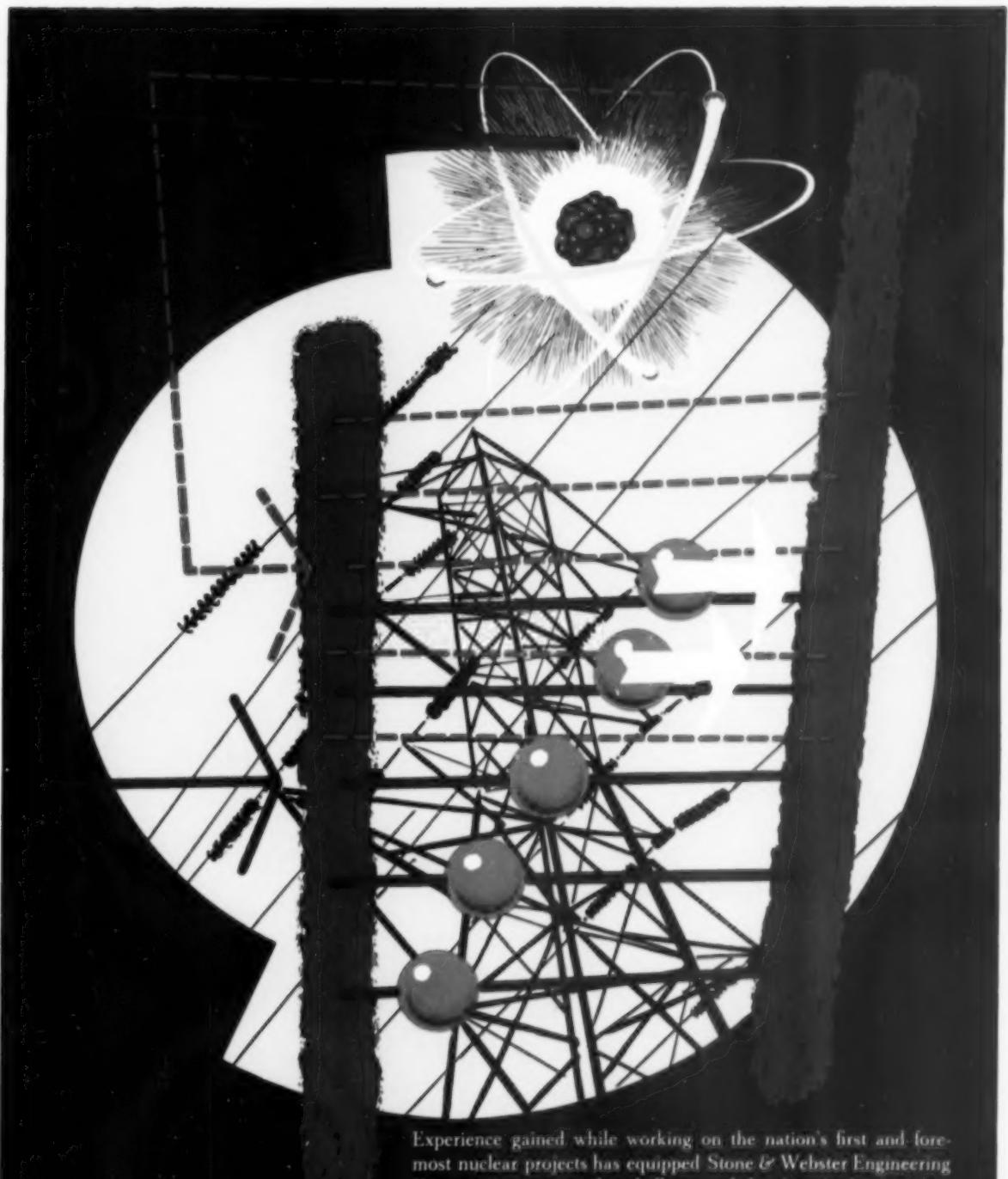


In his new capacity, Mr. Bardouski will coordinate the sales activities of Tube-Strut's national network of factory representatives. Tube-Strut developed and markets a coupling which when used with common pipe or tubing builds every type of storage rack. The clamp is 100% re-usable and adjustable. No threading or welding is required.

### DeWalt — St. Louis

James Denmark has been named St. Louis district sales manager for **DeWalt Inc.**, a subsidiary of American Machine & Foundry Company. From his headquarters in St. Louis, Mr. Denmark will direct the company's sales activities in the states of **Missouri**, southern **Illinois**, and portions of western **Tennessee** and **Kentucky**.

(Continued on Page 110)



Experience gained while working on the nation's first and foremost nuclear projects has equipped Stone & Webster Engineering Corporation to meet the challenges of the Atomic Age.

Among the newest projects now being designed and built by

Stone & Webster, in partnership with Westinghouse Electric Corporation, is the 134,000 kw Yankee Atomic Power Project at Rowe, Massachusetts — a plant which will bring to New England its first source of electric power from atomic energy.

*Write or call us for information as to how our experience can be of assistance to you.*

## STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY of STONE & WEBSTER, INC.

New York • Boston • Chicago • Pittsburgh • Houston • San Francisco • Los Angeles • Seattle • Toronto



# Look how Armco walls can help you SAVE MONEY! SAVE SPACE! PROTECT PROPERTY!

All-steel Armco Bin-Type Retaining Walls solve a variety of earth control problems. Armco Walls are economical, convenient, easy to erect. They won't crack. And they can adjust themselves to foundation settlement without damage.

Write us for complete information. Tell us about your earth retention problems. There is an Armco man near you who is qualified to give you the data and assistance you need.

#### ARMCO DRAINAGE & METAL PRODUCTS, INC.

##### DIXIE DIVISION

619 Forsyth Bldg. • Atlanta, Georgia

##### SOUTHWESTERN DIVISION

C & I Life Bldg. • Houston, Texas  
Other Offices in Principal Cities

## ARMCO Bin-Type Retaining Walls



This Armco Wall saved valuable land where two sidings entered the plant at different levels. Without the wall, more space would have been required between the tracks to accommodate the ground slope to the lower line.



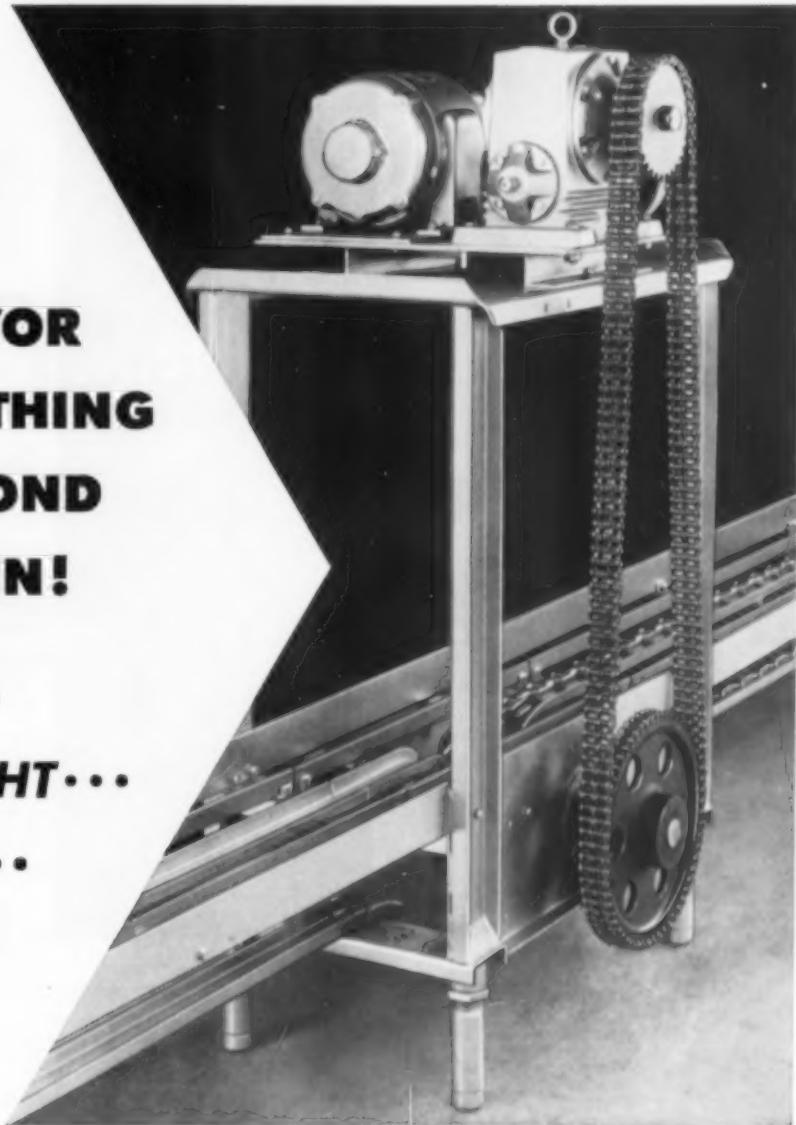
An effective yet economical loading dock is provided by this Armco Wall. Bolted construction permits quick, low-cost erection. Each piece is shipped ready for assembly. There is nothing to cut, nothing to weld.



Here two Armco Walls are installed to keep steep embankments from encroaching on newly expanded industrial facilities. The unique design of Armco Walls employs earth itself. Each interconnected bin is filled with earth to provide the necessary stability.

# FOR CONVEYOR DRIVES—NOTHING BEATS DIAMOND ROLLER CHAIN!

**POSITIVE...**  
**LIGHT WEIGHT...**  
**LONG LIFE...**  
**FLEXIBLE...**



● On this model of a Cherry-Burrell Case Conveyor, the power drive is located some distance *above* the conveyor shaft. On others the drives may be shorter or located below the shaft. In any case the Diamond Roller Chain assures non-slipping power transfer in the most practical and economical manner.

Gears would require more bulk and weight, with costly shafts and bearings.

Belts for this kind of application cannot provide the accuracy of conveyor movement and timing.

Diamond Roller Chains are highly flexible in application. Their *light weight* in relation to power

transferred helps improve machinery design. The efficiency of Diamond Roller Chains cannot be matched by any other method of power transmission.

Diamond Application Engineers have sixty-seven years of experience to draw from in making recommendations. This experience is available to help solve your drive problems. No obligation of course.

#### **DIAMOND CHAIN COMPANY, Inc.**

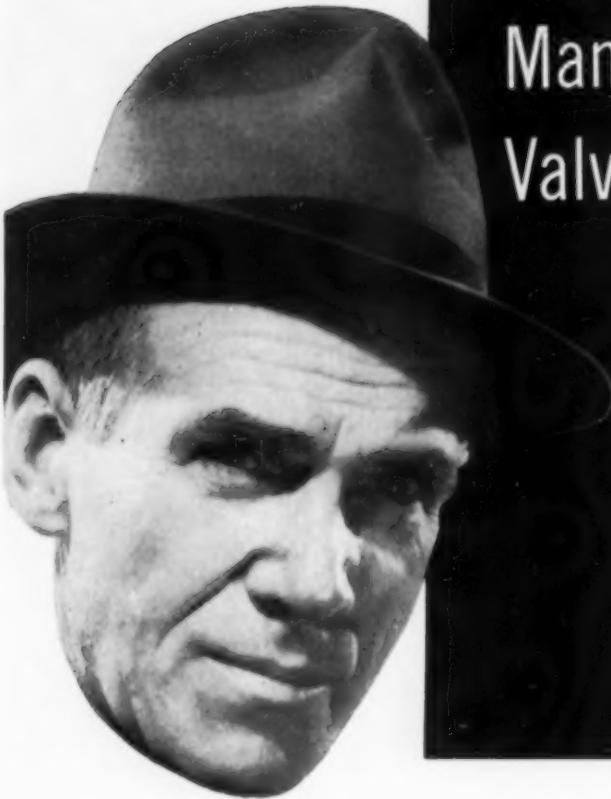
*Where High Quality is Traditional*

Dept. 612, 402 Kentucky Ave., Indianapolis 7, Indiana

*Offices and Distributors in All Principal Cities*

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

**DIAMOND**   
**ROLLER**  
**CHAINS**



## Valve Man's Valve...

### CHAPMAN LIST 960 SMALL FORGED STEEL GATE VALVE



There are good reasons why men-in-the-know specify Chapman List 960 for more jobs than other small forged steel gate valves. These reasons concern two important points . . . (1) long-range performance and (2) low-cost maintenance.

To begin with, Chapman List 960 valves have wedge faces that are super hard . . . tough enough for severe conditions. These wedge faces are hardened to 800 Brinell by Chapman's *exclusive Malcomizing process*. They can't seize or gall. And even the long-wearing, easily replaceable seat rings are made of hardened stainless steel.

There are no trouble-makers from top to bottom. No full-pressure repacking difficulties. No exposed threading.

For pressures from 380 psi at 1000°F. to 2000 psi at 100°F. (Anything higher, use Chapman List 990 valves.) Sizes range from  $\frac{1}{4}$ " to 2" . . . all in many alloy combinations. They come with rising stem with yoke or with inside screw. Bonnet joint ground metal to metal or gasketed, as you prefer.

You'll find them all . . . everything you want . . . in our Catalog 10. Write for your copy, now.

THE  
**CHAPMAN**  
VALVE MANUFACTURING  
COMPANY  
INDIAN ORCHARD  
MASS.

# TIMELY COMMENTS



## Better Engineering Teachers

**NEED FOR** more young engineers has set off a barrage of criticism of engineering colleges and educational facilities. Criticism is wholesome, and no doubt schools will have cause for reflection and may benefit therefrom. But since a large part of the discontent is being expressed by industrial leaders, these leaders should first carefully examine their own practices and see what they can contribute toward improvement of engineering schools and their alumni.

The best engineering teachers are usually developed from young graduates that really want to teach. Salaries are not so low that teaching is a totally unattractive occupation. Dedication to the cause and prestige can tend to compensate for the slight salary deficiency.

Prestige is particularly important to the young teacher. And that is where the industrial executive can help most.

Assuming that young teachers are adequately prepared academically, the next essential is a knowledge of the field their graduates will serve. The teachers must feel that they are a part of the industry they serve. They must know that their efforts are important and respected.

Industrial leaders (including top executives) need to maintain close helpful relationships with the nearby schools. An occasional speech to the graduating class and a cheerful "good morning" to the dean are not enough.

### What Schools Expect from Industry

We have heard a lot about what industry expects of the schools. Here is a list of some important things the schools may expect of industry.

1. Fair pay and good treatment of graduates. Too often industry is only interested in the top 25% of graduates. No matter how much schools improve there will always be a bottom 25%.

These men can also serve. Actually, few industrial jobs are worthy of the top 25%.

2. Pay and "bait" should not be used to place premium quality men on mediocre assignments.

3. Young engineers should be accepted into the organization with the same cordiality and enthusiasm that young doctors and lawyers are received by their professions.

4. Teachers should be encouraged to do summer and special assignment work in industry. How else can they really learn what industry needs in way of training?

5. Executives should accept invitations to participate in college activities. Special lectures to students, participation in forums, guidance of student associations, invitations to visit plants, part-time employment of students, willingness to be interviewed by students and teachers, and perhaps a few scholarships and awards to encourage scholastic excellence — these are only a few of the ways industry can help.

6. Leaders of industry should participate in engineering association activities. Here is where the professors outshine eminent engineers. Go to any local meeting of ASME, AIEE, ASCE, etc. You will find that the burden of keeping the professional society functioning is falling on the teachers, the salesmen and the "nonexecutive engineers." Top bracket engineering department heads of large industrial organizations are not there. They have "other engagements." They will come and make a speech (often not a good one) when invited. But they are seldom in the audience to encourage and help the lesser lights that are trying to learn to shine.

AND FINALLY — industry must realize that there never will be enough top quality engineers — just as there never will be enough top quality lawyers, doctors, preachers, or executives. Much study and effort is needed to make maximum use of the talent that is available.



## BORDEN ALUMINUM GRATING IN NEW MELLON SQUARE PARK . . .



### PITTSBURGH, PENNSYLVANIA

Encircled in the picture above is one of several aluminum grating air vents in use throughout the park as air exhausts for the multiple-level parking area below ground.

The arrows indicate two of the locations of a system of drain trenches in existence throughout the park.

The grating installed is Borden Pressure Locked Aluminum Grating. This was an exacting job, one where only standards of quality equal to Borden's would do. Functional beauty and low maintenance are but two of the many advantages of Borden's Pressure Locked Aluminum Grating.

#### BORDEN METAL PRODUCTS CO.

Gentlemen:

Please send me BORDEN Catalog

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY NAME \_\_\_\_\_

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CITY AND STATE \_\_\_\_\_

Write for complete  
information on BORDEN  
All/Weld, Pressure Locked, and Riveted Floor  
Gratings in this FREE 8-page catalog

#### BORDEN METAL PRODUCTS CO.

853 GREEN LANE    Elizabeth 2-6410    ELIZABETH, N. J.  
SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.

# INDUSTRY SPEAKS

SOUTHERN POWER  
AND INDUSTRY

## Management Support . . . Methods and Objectives

Abstracted from an address by **C. J. BACKSTRAND**, President of Armstrong Cork Company at the annual convention of wholesale distributors of Armstrong building products . . . **Macon, Georgia**.

**ANYTHING** worthy of management support is worthy of wholehearted, active and enthusiastic support. A simple "yes" or "no" or tacit endorsement will never express the nature of one's feelings or the extent of them. And a single statement, no matter how clearly expressed, is easily forgotten.

Management support of any worthwhile effort divides into three fundamental parts — communication, accountability and continuous encouragement.

### Communication

There are many ways of communicating ideas and objectives to an organization. They can be written in memorandum form, or stated orally at a meeting, or both. But whatever form is used, it is important to remember that genuine enthusiasm on the part of management speaks more eloquently and forcefully than facts and figures.

Enthusiasm is a strange thing. People instinctively recognize it for what it is. If it is simulated or forced for its effect, they can spot it immediately, and they resent it. If it is genuine — born out of study, analysis and conviction, they will recognize it and be stimulated by it.

People are emotional — and emotions reflect the depth as well as the strength of feelings. Therefore, regardless of what we say, other people are going to judge the degree of our convictions by the manner in which our enthusiasm is expressed.

### Accountability

The next step in lending management support is the establishment of objectives, assigning responsibility for their achievement, and then holding people accountable for their attainment. No program has real meaning unless people are given the responsibility and authority to carry it out and are held accountable for the results.

But to hold them accountable, objectives must be established — reasonable objectives that are possible of attainment, and yet objectives that require well-directed and persistent effort.

Establishment of accountability for results, when done in the right way, is a means of letting employees know what is expected of them — something every capable employee is anxious to know. Furthermore, employees seek recognition. Holding them accountable for results helps to insure that they will get that recognition for jobs well done.

### Encouragement

Objectives tend to tarnish or become lost in the shuffle of day-to-day problems and people are easily diverted by the impact of ideas from others. Therefore, the business manager must find ways of bringing people back to the main objectives — and of regenerating their enthusiasm for the task to be accomplished.

People down the line in an organization must be more concerned with today's practical problems. Managers must concern themselves with the way they want things to be if they are to build for the future. Subordinates deal with the way things are — as they must if they are to accomplish those things today that will make possible progress for tomorrow. Coping with this inevitable conflict between the dream and reality — tomorrow and today — is a real challenge to management.

There are many ways that it can be done. Quite obviously one is to hold frequent meetings to reindoctrinate people, restimulate them, and thus keep them on course. However, such formality is not essential. The simple act of asking people how a certain program is going whenever you see them — in the hallways, at lunch, or just walking around the office — has the effect of demonstrating that you are still very much interested, and will indicate your willingness to discuss any problems they are encountering.

The role of top management in the establishment of objectives and adopting specific programs for accomplishment is vital to any successful business. In my judgment, it is a major key to success in taking full advantage of opportunities.

**Safety Record by Chemstrand, Pensacola, Fla.**



## Everybody Won

**A WORLD'S SAFETY** record for textile plants was set here by the Chemstrand Corporation's big nylon manufacturing plant at Pensacola, Florida.

Plant Manager Fred G. Gronemeyer said that at the time this picture was taken the more than 4,800 nylon plant employees topped the previous record of 13,624,000 man-hours without a lost-time injury.

According to National Safety

Council figures, this represents the safest work record among the more than 7,000 textile plants in the United States.

The plant started its record-breaking safety run August 25, 1955. Since starting operations in late 1953 plant employees have chalked up two other periods of more than two and a half million man-hours without a lost-time injury.

The plant received the Nation-

al Safety Council's highest award, "The Award of Honor" in both 1955 and 1956. Last year the entire Chemstrand Corporation won Safety Council recognition for completing the year without a lost-time injury.

Commenting on the new world's record by the Pensacola plant, Gronemeyer said, "This again demonstrates the results of co-operative efforts on the part of each employee. No goal is too great to be accomplished with teamwork of this kind. My sincerest thanks are directed to each nylon plant employee for proving that it is possible through constant vigilance, practice of safe methods, and above all, the proper safety attitude, to avoid serious or crippling injuries in a modern industrial plant. This present achievement should inspire us to continue as a 'no-injury' plant indefinitely."

### Two Awards Won

Employees of the plant were presented two awards from the National Safety Council and one from the State of Florida. Roy G. Benson, assistant director of the National Safety Council's Industrial Safety Division, presented one national award for the lowest frequency rate in the textile industry in 1956 and the top-ranking "Award of Honor" for breaking the world's record. J. T. Vocelle, chairman of the Florida Industrial Commission, presented a special Florida citation.

Chemstrand President Edward A. O'Neal, Jr., Decatur, Alabama, and Mr. Gronemeyer accepted the awards "in behalf of every one of the employees of this plant who should get full credit for making this world's record."



# Utility Plant

Safety director W. W. Sloan, is holding the new plaque beside one of the company's safety bulletin boards. A certificate on the board shows that Nantahela also won third place in the Exchange's fleet safety contest.

## Safety Record by Nantahela, Franklin, N. C.



## Nobody Disabled

**NANTAHELA** Power and Light Company was awarded first place in the Southeastern Electric Exchange 1956 safety contest among member companies. Nantahela had the lowest accident frequency rate and no disabling injuries. The plaque was accepted for the company by its president, John M. Archer, Jr., at the annual meeting of the Exchange in Boca Raton, Florida.

Editors of SPI enjoyed congratulating the winners. But more important, they requested information on how the excellent record was attained—so other plants can consider similar procedures. Here is the answer from Nantahela's safety director:

### Southern Power & Industry

Dear Sirs:

First, and probably the most important of all factors contributing to our 1956 record of no disabling injuries, is the whole hearted support and interest of our top management in the elimination of accidents. This attitude of management has permeated through our relatively small organization and has been a big help in securing cooperation from all personnel.

For the past two years we have been stressing the importance of eliminating all accidents—not just the disabling ones. The severity of an injury is somewhat a matter of

chance, and the only way to reduce the frequency of disabling injuries is to reduce or eliminate all injuries. We submit a monthly report to all supervisors and foremen, showing the number of man-hours worked, injuries sustained and the frequency rate of all injuries for each crew or operating unit. We believe this report has stimulated interest in safety among the foremen and their men.

We also post charts at the various operating locations showing the current records of all crews and operating units. These charts are revised monthly to show the total man-hours worked by each

unit since the last disabling injury. The current leader is our largest line crew with 156,000 man-hours worked since that crew's last disabling injury, May 29, 1950.

Last year we began a system of quarterly safety inspections in which all supervisors and foremen serve on an inspection committee and will eventually inspect all of our properties. These three-man-committees have already uncovered many hazards that had gone unnoticed. This system of inspections improves safety conditions and also increases the safety consciousness of our supervisory personnel.

We use periodic safety meetings to review first aid practices and to present general safety information.

A combination of the above features, plus the fact that we experienced practically no turnover in personnel during 1956, as well as the excellent cooperation of all supervisors, foremen and workers have made our record possible. All of our employees are more safety conscious as a result of the honors we have received. Individual efforts would have been in vain without the full cooperation of all members of our organization.

W. W. Sloan, Safety Director  
Nantahela Power and Light Co.

## Meet the "Function Transfer Relay"

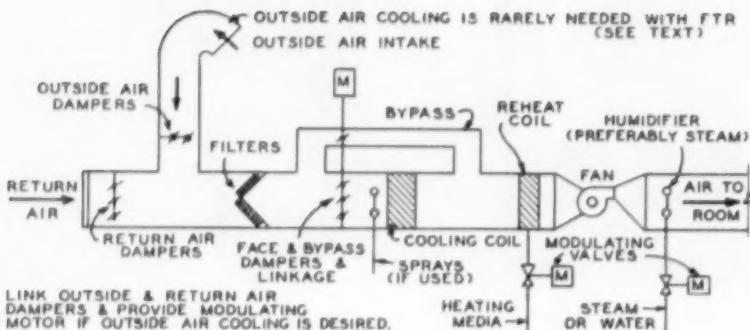


Fig. 1 Air Unit Arrangement

The "Function Transfer Relay" is not one relay, but a group of several conventional electrical and/or pneumatic relays interlocked (or end-switched) to provide the change in control functions outlined on Fig. 2 and described in the text. All of these operating devices are for simplicity included under the broad term FTR.

ANY PLANT maintaining temperature and humidity control must determine the air quantity circulated by the highest sensible heat gain condition and the coincident latent heat gain. Thus, if there is no latent gain, supply air temperature must be high enough so as not to reduce plant humidity and air quantity must be high enough to overcome the sensible gain at supply temperature.

Air quantity cannot be reduced at partial load because air distribution will be adversely affected. Therefore reheat and rehumidification are generally employed to maintain desired plant conditions at partial load.

As explained in the author's article on "percent Process Control" (*Southern Power & Industry*, Sept. 1956), such a procedure is fundamentally wasteful. While "P.P.C." reduces this waste substantially on existing plants, new plants can now be designed that will perform even more economically than on "P.P.C." by utilizing the "Function Transfer Relay."

The Function Transfer Relay (FTR for short) relies on the fact that as supply air temperature is increased, less sensible and less latent heat will be removed from the plant; and that if this supply

By JOHN A. WEBER  
Engineer  
Corpus Christi, Texas

temperature is controlled by either the room thermostat or humidistat, then the remaining of the two will be free to add either reheat or rehumidification as required. Note that reheat and rehumidification will never be simultaneously required (except at very low outdoor temperatures as later explained).

The refrigeration plant (employing FTR) may be absolutely conventional. If the air unit cooling coils are direct expansion type, the refrigeration plant should, however, be equipped with capacity unloaders for partial load operation. If air unit cooling coils are chilled water, then a constant chilled water supply temperature is all that is necessary. The air units must have face and by-pass dampers to reduce the effectiveness of the cooling coil. For simplicity, no outside air intake will be assumed for the time being.

With the cooling coil refrigerant entering at constant temperature, the mean effective temperature difference between refrigerant and air over the coil will increase as

the bypass is opened and less air passes over the coil. The result is that the air leaving the coil, even when remixed with the air circulated through the bypass, will be such that a lower percentage of sensible heat as compared to total heat will be removed from the plant.

If the plant load should have characteristics matching those of the coil at all load conditions, either a thermostat or humidistat could be used to control the dampers and perfect plant conditions would be maintained once the system had been initially adjusted.

Such, however, is rarely the case. One solution is to design the air unit to remove an excess of moisture at all conditions; then if the dampers are controlled by a thermostat a humidifier can be added and rehumidification always supplied to maintain plant conditions. This is the simplest method and in many plants may be entirely suitable.

Another solution is to design the air unit in the conventional manner and to control the face and bypass dampers with the room thermostat in the "base" position. The humidifier will then be controlled by the room humidistat.

Now suppose that the room

## Maintain plant air temperature and humidity at desired levels for the least operating cost — automatically.

humidistat indicates that room humidity is too high and the thermostat is not calling for enough cooling to hold down humidity. Here is where the FTR transfers control of the dampers from the "base" position to the "alternate" position; that is, the dampers are taken over by the humidistat and the reheat coil is then controlled by the thermostat.

Control will remain in the "alternate" position until the modulating steam valve on the reheat coil closes down to the zero position (or the thermostat rises above set level). When this occurs, humidity requirements are not simultaneously meeting cooling requirements and the FTR will send control action from the "alternate" back to the "base" position.

Thus, only that amount of cooling needed to satisfy the worst room requirement will be supplied; and only the amount of reheat or rehumidification needed to correct load conditions will be supplied. Savings are obviously great. Actually with a one-shift plant savings can be as great as two thirds of the yearly electrical and fuel quantities.

Short cycling can be eliminated by using a time-delay relay to space FTR action. However, such

a relay is unnecessary where modulating type controls designed for continuous control action are used.

Now, suppose we add back the return air inlet. This inlet may be placed ahead of the return air filters in the conventional manner and will not affect FTR action in the least unless we desire to use "Outside Air Cooling" action as discussed in the author's article in *Southern Power & Industry* for October, 1956.

The reader should be aware however that outside air cooling in connection with FTR would rarely prove beneficial—only in well insulated buildings with very high internal cooling loads.

"Outside Air Cooling" depends upon the fact that at some outdoor dry bulb temperature the given plant can operate with 100% outside air and with the refrigeration plant turned off by means of an outdoor thermostat. The excess aid taken in may be relieved from the plant space by means of gravity operated automatic dampers. Over this temperature range, the FTR is utilized to modulate linked outside air and return air dampers in response to either the room thermostat or humidistat; the remaining "stat" then operates the

reheat coil or the humidifier as required. Such an arrangement is advantageous only when the process load is higher than the building cooling load and cooling is required at low outdoor temperatures.

Whether "Outside Air Cooling" is used or not, at some outdoor temperature conditions will be such that both heat and humidity must be added in the air unit. At this outdoor temperature, the FTR is in effect turned off; and the reheat coil and humidifier are allowed to operate simultaneously to add required heat and humidity as demanded by the room thermostat and humidistat respectively. At this temperature, the refrigeration plant is turned off and the face and bypass dampers are set so that all air bypasses the cooling coil.

An accompanying drawing shows the air unit arrangement and a diagram shows the control action for varying outdoor air temperatures. A study of these figures and of your own plant operation should point the way to many operating economies in your new plant over the conventional temperature and humidity control concepts.

Fig. 2 Typical Control Action

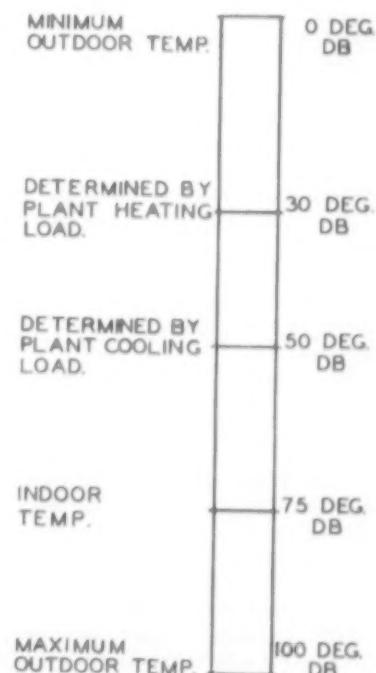
From 0 to 30 degrees outside air is at fixed minimum required for ventilation. Refrigeration plant is off. FTR is turned off (by outside air thermostat) so that heating and humidification may be simultaneously added as required. Face and bypass dampers are set for all air to be bypassed.

From 30 degrees to 50 degrees outside air is at fixed minimum required for ventilation. Refrigeration plant is on. Face and bypass dampers operated by room thermostat or humidistat as set by FTR.

From 50 to 75 degrees control is identical to that for the 30 to 100 degree range if "outside air cooling" is not used.

If "outside air cooling" is used, action from 30 degrees to 50 degrees will be such that refrigeration plant is off, all air goes through bypass around cooling coil, and FTR is in action operating linked and motorized outside and return air dampers in response to room thermostat and humidistat.

**NOTE:** Whenever FTR is operating, room thermostat controls dampers in "base" position, room humidistat controls humidifier, and reheat coil is off. In "alternate" position, room humidistat controls dampers, room thermostat controls reheat coil, and humidifier is off.



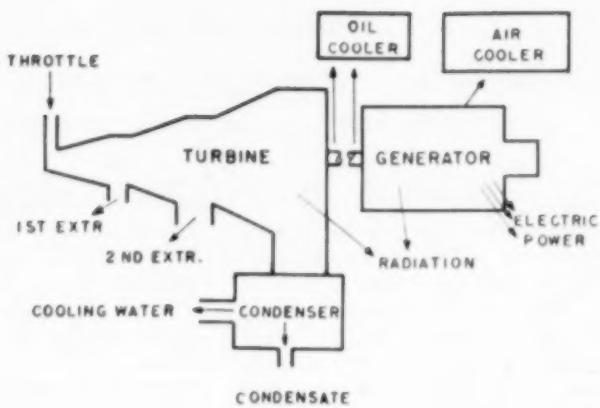
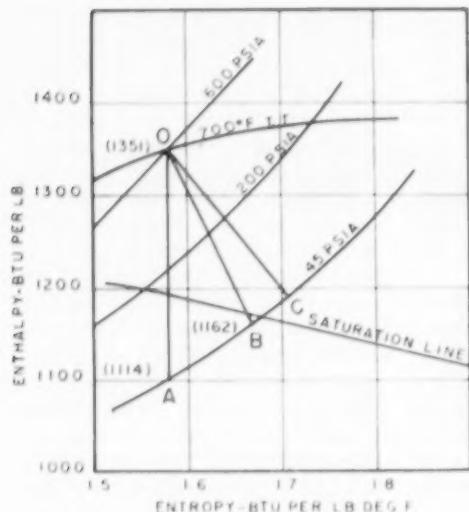


Fig. 1. Left. Mollier chart for back pressure turbine; Fig. 2. Above. Schematic diagram of turbine.

# A Practical Approach to ALLOCATION OF HEAT In an Industrial Power Plant

**THE HEAT** chargeable to power generation in an industrial plant may be determined easily from only two measured quantities, the electrical output in kilowatthours and the flow to the condenser in pounds.

Heat chargeable to power generation is the product of the kilowatthours times a constant plus the product of the condenser steam flow times another constant; both constants are specific to each particular plant and its operating conditions. They may be easily determined.

**FIRST CONSIDER** what happens to the properties of the steam as it passes through a steam turbine. Fig. 1 is a section of a Mollier diagram showing the expansion of steam in a simple back-pressure turbine.

Initial steam conditions are 600 psia and 700 F total temperature (TT). Enthalpy of the throttle steam is 1351 Btu per lb. In a perfect engine steam will expand adiabatically to the exhaust pressure of 45 psia. On the chart this is vertically downward at constant entropy (line OA). Enthalpy of the exhaust is 1114 Btu per lb. This is the Rankine cycle.

In other words the steam gives

up the maximum possible energy to be converted into mechanical power. In this instance the steam gives up 1351 minus 1114 or 237 Btu/lb. Our perfect engine is frictionless and loss free. 3413 Btu is the thermal equivalent of 1 kwhr. The theoretical steam rate (TSR) of our engine will be 237 divided into 3413 or 14.4 lb of steam per kwhr.

A steam turbine is not frictionless, however, and there are other losses. Furthermore the steam does not give up all heat possible, but because of friction and turbulence during expansion, heat and temperature changes take place and the steam actually expands along

the line OB or OC, with increase in entropy. Less than the ideal or maximum possible heat is converted to mechanical energy.

Let us assume that our actual turbine requires say 3600 Btu in shaft energy to produce 1 kwhr, and that Rankine cycle efficiency is such that steam expands along line OB to 1162 Btu per lb. Heat drop is 1351 minus 1162 or 189 Btu per lb. Actual steam rate is then 189 divided into 3600 or 19.67 lb of steam per kwhr. This value is the steam rate furnished by turbine manufacturers. It varies with the load.

## Heat Accounting

Let us investigate what happens to the heat which enters a turbine at the throttle. Refer to Fig. 2 which is for a double extraction-

Abstracted from a paper presented at the American Society of Mechanical Engineers, Spring meeting in Birmingham, Alabama April 9, 1957.

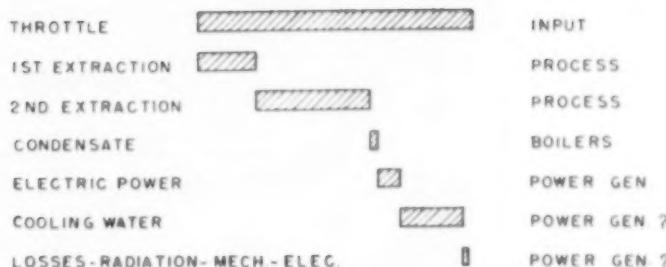


Fig. 3. Heat balance—per kw.

condensing steam turbine and will illustrate all possibilities.

Steam containing energy in the form of heat (enthalpy), measured in Btu per lb, enters the turbine at the throttle. It passes through the first section of the turbine where the drop in enthalpy is converted to mechanical energy. Part of the steam is extracted at the first extraction point.

The balance of the steam flows through the second section of the turbine with a drop in enthalpy equivalent to the heat converted to mechanical energy. Again some of the steam is extracted at the second extraction point.

The balance of the steam passes through the third section of the turbine where the drop in enthalpy is converted to mechanical energy. Finally this steam flows into the condenser where the latent heat is transferred to the condensing water and the heat of the liquid is returned to the boilers.

On the diagram the heat extracted at both bleed points is chargeable to process. The heat in the condensate is chargeable to the boilers. The radiation losses, the friction losses picked up in the oil cooler, the electrical and windage losses picked up in the air cooler and the energy as electric power (3413 Btu/kwhr) is chargeable to power generation. Likewise where the heat rejected in the condenser is wasted, this energy is chargeable to power generation.

In some instances, as I will point out later, all or a part of the heat picked up in the oil cooler, the air cooler and the main condenser may be utilized for process and is not charged to power generation.

Fig. 3 shows in block form the relative values of the heat energy for a particular set of conditions.

3. Electrical and windage losses.
4. Electrical energy produced (3413 Btu/kwhr).
5. Heat rejected in the condenser.

Item 1—the radiation losses are very small in a well-insulated turbine. The magnitude is within the accuracy of the other components and may be neglected.

Items 2, 3, and 4 represent the actual shaft power that is converted from heat energy to mechanical energy in the turbine. In other words it is the actual loss in enthalpy of the steam in passing through the turbine.

Item 5 is the latent heat of the steam which is transferred to the cooling water in the condenser.

Assuming that there is no recovery of heat in the air cooler, oil cooler, and the main condenser, then we arrive at the following formula for heat chargeable to power generation:

$$\text{Btu for power generation} = \text{Kilowatthours} \times K_1 + \text{condenser flow} - \text{lb} \times K_2$$

It is only necessary to determine  $K_1$  and  $K_2$ .

#### Kilowatthour Factor

One kilowatthour is equivalent to 3413 Btu. The losses (radiation, friction and windage, electrical) may be obtained from turbine designers and for the particular machine. The sum of these two values is the factor  $K_1$ . It is the heat which is converted to mechanical energy in the turbine.

Fig. 4 shows typical total losses (in Btu per kilowatthour) plotted against per cent load. Radiation, friction, and windage losses are about constant for all loads; excitation losses vary slightly with the load and stator losses vary pretty much as the square of the load. Hence the curves take on their peculiar shape.

These curves are for data furnished by a manufacturer for turbines ranging from 3750 to 12,500 kw. As will be noted the losses are higher in the smaller machines.

If the losses are added to 3413 we obtain the Btu required to generate 1 kwhr. The curve (Fig. 5) is a plot of Btu per kilowatthour versus load. For all practical purposes this may be considered a straight line and ranges from 3700

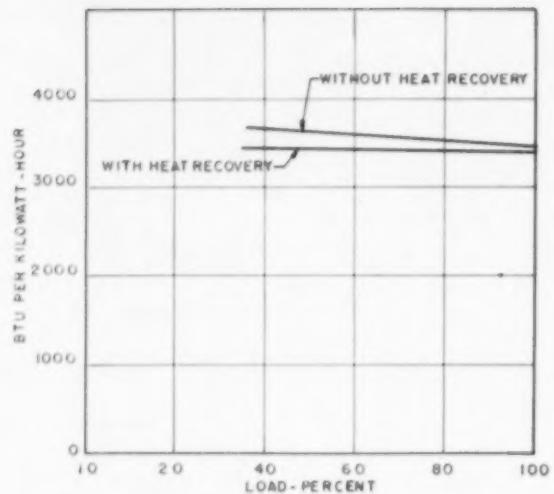
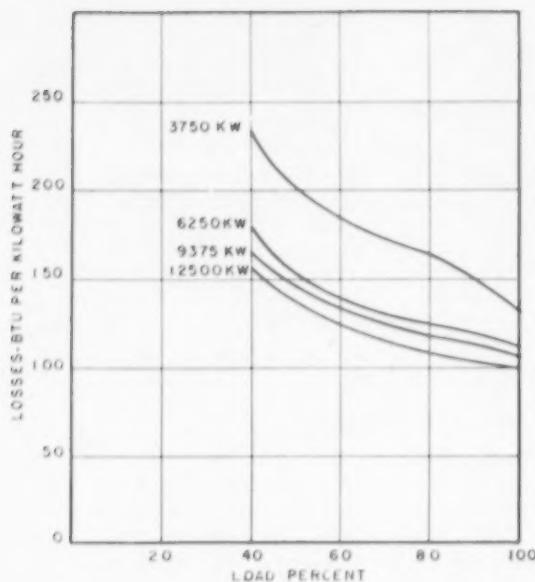


Fig. 4. Left. Total losses in Btu per kilowatt-hour; Fig. 5. Above. Btu per kwh, with and without heat recovery in air and oil coolers.

Btu per kilowatthour at 40 per cent load to 3500 Btu per kilowatthour at full load. Where there is no heat recovery in the air and oil coolers, this is the factor  $K_1$ .

It is possible to recover practically all of the losses in the air and oil coolers. Under these conditions (heat recovery) the factor varies from 3460 Btu per kilowatthour at 40 per cent load to 3443 Btu per kilowatthour at full load. Under these conditions and for all practical purposes  $K_1$  may be considered 3450 for all loads.

#### Condenser Factor

The determination of the condenser factor ( $K_2$ ) is not too difficult. The turbine designer can be of material assistance.

Fig. 6 is a typical curve showing the enthalpy of the steam at the extraction points of a double-ex-

traction turbine versus steam flow in the several sections. This information may be obtained from the turbine manufacturer. This particular curve is for a 5000-kw 600-psia 700 F TT turbine with extraction at 165 psia and 65 psia.

For example, with a throttle flow of 140,000 lb per hr the enthalpy at the first bleed point is 1266 Btu per lb of steam. Rankine cycle efficiency in this section is about 70 per cent.

With a throttle flow of 140,000 lb per hr and 60,000 lb per hr extracted at 165 psia, the enthalpy at the second extraction point is 1205 Btu per lb — a Rankine cycle efficiency of 80 per cent in the second section.

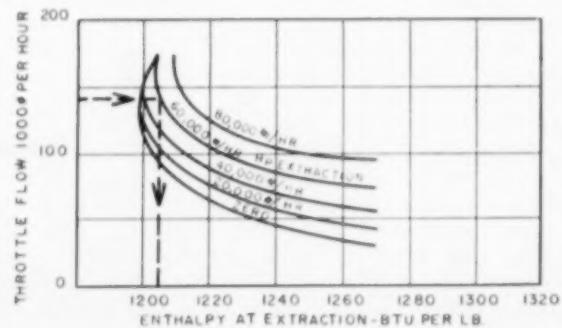
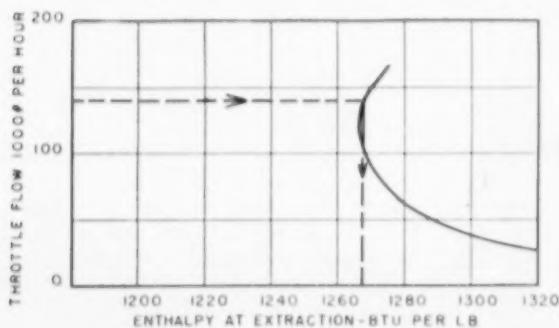
For lighter loads and lower steam flows the Rankine cycle efficiency is lower — about 60 per cent at 40 per cent load.

In general the Rankine cycle efficiency is lower at higher initial pressures and in smaller machines; conversely it is higher for lower initial pressures and for larger machines. Fig. 7 shows the general trend of the Rankine cycle efficiency at pressures 600 psia and 200 psia and for turbines ranging from 2000 kw to 7000 kw. Thus it may be concluded that the Rankine cycle efficiency is higher in the lower pressure stages of an extraction turbine and that we may expect optimum efficiencies of about 80 per cent in the last section of a turbine.

Let us pursue this and determine the condenser factor for our machine.

Fig. 8 is a Mollier chart showing the expansion of the steam in the various stages of a turbine. Using the manufacturer's chart (Fig. 6)

Fig. 6. Typical curves showing enthalpy at extraction. Left—high pressure. Right—low pressure.



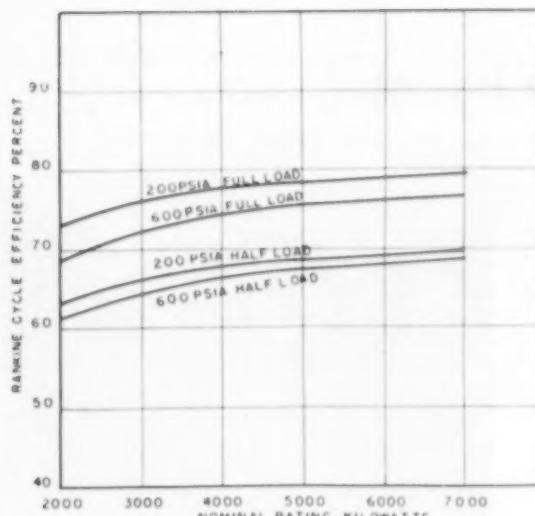


Fig. 7. Rankine efficiency vs initial pressure and rating.

or the curve (Fig. 7) we may determine the Rankine cycle efficiencies in the several stages and plot the expansion of the steam for several conditions of load.

For full load the steam expands along line OA in the first section (Rankine cycle efficiency 70 per cent). In the second section the steam expands along line AB (Rankine cycle efficiency 80 per cent).

Assuming an efficiency of 80 per cent from the second extraction point to the condenser, expansion will be along line BC to  $2\frac{1}{2}$  in. absolute. Enthalpy at this point is 992 Btu per lb. The heat of the liquid at  $2\frac{1}{2}$  in. absolute is 76 Btu per lb.

Therefore our condenser factor ( $K_2$ ) for this condition is 992 minus 76 or 916 Btu per lb. This is the latent heat rejected to the cooling water.

For a light load (say 40 per cent the expansion will follow the dotted line OA', A'B' and B'C' to an enthalpy of 1076 Btu per lb entering the condenser. Heat of the liquid is again 76 Btu per lb. The condenser factor for this condition is 1076 minus 76 or 1000 Btu per lb. This again is the latent heat rejected to the cooling water.

Usually the condenser factor  $K_2$  will fall between the limits of 910 Btu/lb and 1000 Btu/lb, varying with load. Knowing the general

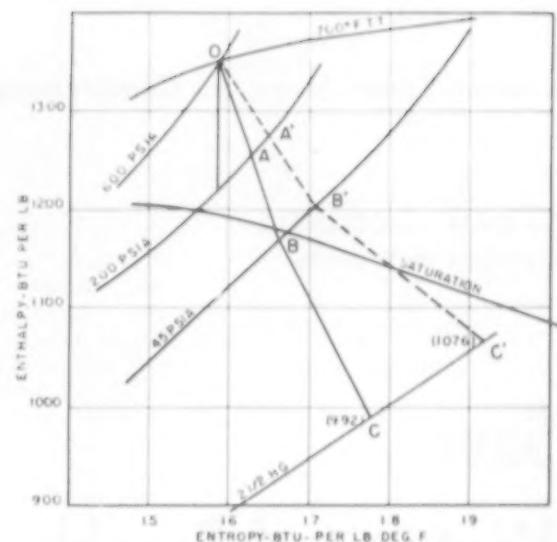


Fig. 9. Mollier chart for double extraction turbine.

load conditions this figure may be determined within the limits of accuracy of the meters used.

#### Computations

The heat chargeable to power generation in an industrial plant may be determined from two readings, the kilowatthours generated, and the steam flow to the condensers.

$K_1$  is what I call the kilowatt-hour factor. Without heat recovery from the oil and air coolers  $K_1$  varies from 3700 Btu per kilowatt-hour at light load to about 3500 Btu per kilowatthour at full load. With heat recovery from the coolers a figure of 3450 may be used.

$K_2$ , the so-called condenser factor, varies from 910 Btu per lb of condensate at full load to about 1000 Btu at real light load. An average figure of 950 Btu/lb is probably within the accuracy required. But knowing the specific conditions of load and extraction, this factor may be determined more accurately.

Then we apply the magic formula.

Btu for power generation =  
Kilowatthours  $\times K_1$  + condensate wasted  $\times K_2$

In a plant with only back-pressure turbines and where all exhaust steam is used for process, and in a plant where all heat is recovered in the main condensers,

we do not need to consider the second term of the formula.

#### Conclusions

Provided that the initial steam pressure is selected to allow proper utilization of process heat, the heat consumption of an industrial steam turbine is independent of the initial steam conditions and exhaust pressure; and the Rankine cycle efficiency of an industrial steam turbine is relatively unimportant.

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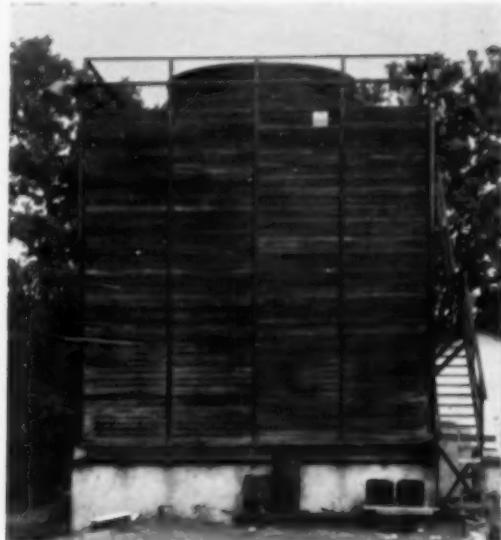
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## Cooling Tower Sizing for Compressors and Aftercoolers

By DAN McCONNELL  
Greensboro, North Carolina

# Save Water and Trouble



**LACK** of abundant, cheap, clean water often makes it desirable to operate air compressors and aftercoolers on water supplied from a cooling tower with pumped recirculation. The heat loads and temperature balances of cooling towers on this service contain a few factors that are not easily available or commonly considered.

Compressor and aftercooler manufacturers generally give the water requirements of their units on the basis of gpm per 100 cu ft of air handled, and the information on the allowable temperature rise through the machinery is not too clearly given.

A major manufacturer in this line shows in its manuals that for a single-stage machine compressing air to 100 psi, the water requirements is 1½ gpm per 100 cu ft of air compressed with the aftercooler and the compressor piped in series and using the same water.

The company also states that its aftercoolers bring air out of the cooler at a temperature of 15 F above the temperature of the incoming water. For compressors working at 25 psi the same information calls for .6 gpm per 100 cu ft.

The data also shows that these quantities are based on an incoming water temperature not less than 65 F, and it is suggested that cooling water come off the compressor at approximately 100 F, but this temperature can be carried up to 110 F without damage to the compressor.

This information does not contain all of the factors necessary to choose a cooling tower. We must have information on the total amount of heat picked up by the water, water quantity and temperature rise.

The prime purpose of the water circulated through the compressor cylinder jacket is to keep the cylinder and valves cool enough for lubrication to function properly. An additional purpose is to pick up friction heat, and do as much cooling on the air being compressed as possible. Since the air is in the cylinder a very short time, there is not much pickup of the heat of compression, and it is the job of the aftercooler to get this heat out.

Since the main purpose of an aftercooler is to remove moisture from the compressed air, the efficiency of this removal is a func-

tion of the temperature of the cooling water. Since water from a cooling tower will probably be hotter than well water we must recognize that more water will have to be dealt with in the air distribution system when the compressors are on a tower rather than a well.

This effect is compounded in the summertime by the higher humidity of air taken into the compressor, and a higher temperature of cooling water fed to the machinery. It all adds up to at least doubling the frequency of blowing down the water traps on the system in the summer.

### Example

As an example, consider a horizontal single stage machine such as an Ingersoll Rand ES-1, 20" by 13", operating at 25 psi and delivering 1132 cfm. This machine is rated at 108.0 brake horsepower or net mechanical power put in at the flywheel. A 100 hp electric motor would probably be used to drive the machine, and all of the electrical losses in the motor and mechanical losses in the V-belt drive would be released as heat to the air of the room the machine is in.

## Putting a cooling tower in the compressor cooling water circuit brings about some changes that make careful checking necessary.

Then, of the 108 hp delivered to the compressor flywheel, some 6% to 10% is used up in friction losses in the frame of the machine and also appears as heat in the room. The balance goes into the piston rod and appears as heat and pressure in the air compressed.

This is the heat that must be picked up by the cooling water, and the problem is to so size the tower and pump assembly that enough of the heat can be released to the atmosphere to keep the cylinder at a satisfactory operating temperature, and to feed the right balance of water to the aftercooler to keep too much moisture from getting into the system.

### Calculations

There are three methods that can be used to calculate the heat load that must be taken out of the compressor - aftercooler assembly. Two of these are theoretical and the third is somewhat rough but thoroughly sound for sizing and easier to handle.

The first basis is to calculate the theoretical adiabatic horsepower put into the air. Using the 20 by 13 machine at 25 psi as an example, the calculation gives a horsepower of 83.6. Since one horsepower is equal to 2545 Btu/hr, the heat release calculates to be 213,000 Btu/hr.

The next basis is to calculate the adiabatic temperature rise as the air is compressed, put in the factors for weight of air handled, specific heat and so on. The figures are: Adiabatic rise from initial condition of 70 F to 25 psi is 178 F, giving a final temperature of 248 F. The air compressed is  $1132 \times 60 \times .075 = 5090$  lb/hr. The Btu/hr being carried away by the hot air is the weight times the temperature rise, times the specific heat of air, or  $5090 \times 178 \times .2381 = 216,000$  Btu/hr which is a rather close check on the first method.

The last and simplest method is to take the brake horsepower of

the compressor, allow 15% of the bhp input for radiation from the frame and other losses in the compressor, and then multiply this horsepower by 2545 Btu/hr. This method gives a heat load to the tower of 234,000 Btu/hr. This looks like a large allowance for radiation, and a large cooling load to the tower, but it is well to err a bit on the side of safety when dealing with cooling, and get the tower a bit large.

### Water Circulated

Most cooling tower people prefer to have water come to their towers cooler than will come with the water quantities usually specified by the compressor people. You get around this by making the amount of water circulated larger, and a good bet is to double the rate given by the compressor people. You then calculate the rise

based on the pounds of water through the machine.

It is well to go at this part of the answer a little backward by getting the total heat load to the cooling water, taking a reasonable temperature rise that you know will work in your area with a tower — say 15 F in the mid-south — and then figuring the gpm required. In sizing the tower the wet-bulb temperature limits of the area must be considered.

### Tower Operation

A word of caution is also necessary on towers. They will cut the water demand down, but they won't save it all. As water evaporates from the tower the solids and mineral content of the water that is left goes up. Therefore to keep the solids content cut down to where the hot surfaces won't scale up, it is necessary to drain the tower on some regular schedule and keep a supply of the best water that is available dribbling in to replace the evaporation loss. Sometimes in hard-water country you might have to use chemical treatment of the cooling tower water.

## CO<sub>2</sub> Finds Electronic Fault

**NEW ELECTRONIC** equipment was installed on the ground floor of one of our power plants. The device worked very well during the warm weather, but as the weather grew cooler the equipment began failing to operate properly during the early morning hours. Hourly tests of the equipment compared with temperature readings taken at the equipment indicated that some part was temperature sensitive.

The usual heat lamp or hot soldering iron treatment failed to locate the offending component. It was suggested that cooling the equipment might simulate the condition which caused the device to fail. After considerable thought it was decided that the

most convenient cooling equipment on hand was the CO<sub>2</sub> fire extinguisher.

Permission was obtained for the use of said extinguisher and one good blast of CO<sub>2</sub> snow caused the device to fail. A finger laid on one after the other of the parts in the suspected circuit soon located the fault. A crystal diode had been wired in without its load resistor.

Since this incident, the CO<sub>2</sub> method has been used on other cases where failure occurred at lowered temperatures. No difficulties have been encountered.

It is very important to have the extinguisher checked and recharged after using. Who knows? Next time there might be a fire in the cabinet.

By W. A. KELLY, Electronic Technician, Southwestern Public Service Company, Amarillo, Texas.

**There Is a Right Way to Install Each Fluorescent Lighting Element**

## ARE YOUR FIXTURES SAFE?



The conduit coupling has loosened from vibration caused by janitors using vacuum cleaners on the storage bins.

**EACH TYPE** of electrical device ushers in its own peculiar type of problems that require attention in order to safeguard the owner against electrical shock and fire loss, not to mention efficiency of operation and power costs.

Installations of fluorescent lighting must comply with the requirements of the National Electrical Code and should include the following safeguards.

**(A) Install** a manual reset type starter, rather than an automatic type since it is most practical with preheat cathode lamps. This is particularly true when installed in recessed fixtures where high heat may be generated in close quarters when a lamp has starter trouble.

**(B) With ballast** an integral section of the recessed type fixture it is not good practice to install it in a recess of combustible type construction unless the fixture is expressly approved for that location. All combustible materials

which is less than 3 in. from the fixture is faced with  $\frac{3}{8}$  in. soft asbestos millboard, transite or like material.

**(C) Fixtures** intended for installation in air conditioning or ventilating ducts should have a minimum clearance of 2 in. from the non-combustible lining of such passages in order to provide sufficient air movement over the heated sections.

**(D) Ventilated** metal cabinets so installed that adjacent combustible material will not be subjected to temperatures in excess of 90 C (194 F) should house the transformers, ballasts, reactors and other auxiliary equipment.

**(E) All wiring** for series type lamps must be thoroughly insulated because of the higher voltage employed and all high voltage wires must be enclosed in metal raceways. Rigid or flexible metal conduit should be used for fluorescent lamp installations.

Note in the illustration showing

**By PAUL C. ZIEMKE**  
Oak Ridge, Tennessee

where the compression type coupling of the thin wall conduit has loosened from vibration and occasional motion impressed on the ganged-up fixtures by janitors using vacuum sweepers on the tops of storage bins.

"Trapeze type" suspension should be anchored against walls or roof trusses to eliminate free swinging motion of the fixture assembly.

Pulling in a bare conductor the same size as the line members for ground protection in the event of insulation failures is highly recommended.

Metal conduit should also be used where the transformer is not an integral part of the fixture.

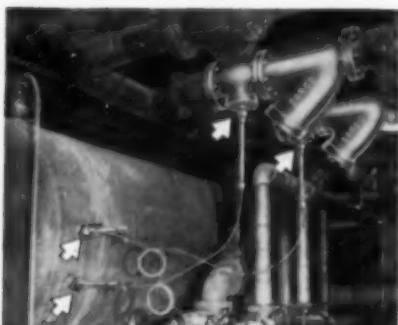
### Code Requirements

These codes cover the recessed fixtures of all types and the fluorescent fixtures in general and are quoted from Section 4176 to 4203 inclusive:

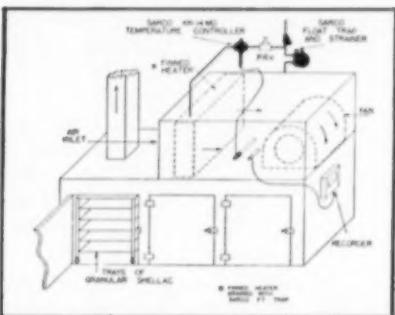
**4177—Temperature.** Fixtures shall be so constructed or installed that adjacent combustible material will not be subjected to temperatures in excess of 90 C (194 F). Where a fixture is recessed in fire resistant material in a building of fire resistant construction, a temperature higher than 90 C (194 F), but not higher than 150 C (302 F) is acceptable if the fixture is plainly marked that it is approved for that service.

**4178—Clearance.** Recessed portions of enclosures, other than at points of support, shall be at least  $\frac{1}{2}$  in. from combustible material. (See additional safeguard mentioned above)

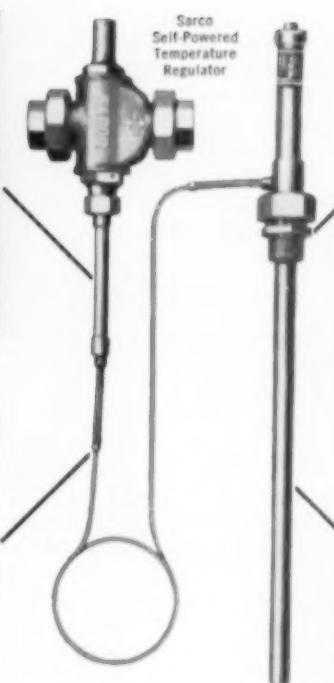
(Continued on Page 56)



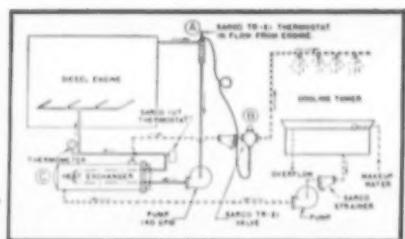
Water storage tanks — Sarco self-powered temperature controls on service water storage tanks from twin heaters.



Shellac dryer — even temperature maintained; moisture uniformity of granular shellac accurately controlled — by Sarco self-powered temperature control.



FOR YOUR INDUSTRY  
Chemical Processing • Metalworking  
Food • Textile • Paper  
Oil Refining • Others



Diesel Engine — Sarco self-powered temperature controller used on diesel engine cooling system. Also ideal for compressors.



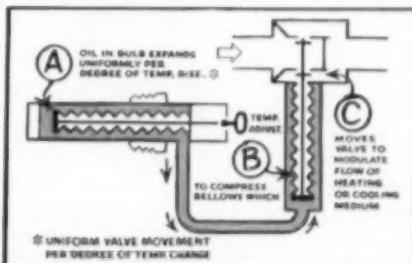
Steam-jacketed kettle — desired temperature of kettle content is automatically maintained by Sarco self-powered temperature control. Steam waste, uncertainty of manual control eliminated.

## How to get Automatic Temp. Control that's simple, dependable, inexpensive

HERE's the way to get rid of uncertain, time-wasting manual temperature control . . . throughout your plant. And without investing in complicated, costly temperature control equipment.

These SELF-POWERED Sarco controls are inexpensive, simple, dependable, accurate. They can be used for 85% of your jobs.  $\frac{1}{8}$ " size costs only about \$100!

Thousands of these Sarco controls are giving dependable, accurate service for firms such as Colgate-Palmolive Co., Sinclair Refining Co., Swift and Co.



AS SIMPLE AS ABC . . . that's Sarco Self-Powered Temperature Control. A thermostat with capillary tubing and a valve . . . that's all there is to it!

### SARCO SELF-POWERED TEMPERATURE CONTROLLERS —need no power source

1. Self-Powered — no compressed air or electricity needed.
2. Easy to install — by any pipe-fitter.
3. Self-contained — no exposed mechanism. Packless valve.
4. Simple — no gadgets that take a technician to read and repair.
5. Not affected by cross-ambient temperatures or elevation of the bulb.

Send for Bulletins: No. 620 — Self-powered Temperature Controls. No. 710 — Self-powered Cooling Controls. No. 1025 — Electric Indicating Temperature Controls. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

2208-B

**SARCO**  
Automatic Temperature Control

ELECTRIC INDICATING AND SELF-POWERED TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS

## Lighting Fixtures Safe?

(Starts Page 54)

**4179—Wiring.** Conductors having insulation suitable for the temperatures encountered shall be used. Where conductor temperatures are in excess of 60 C (140 F), conductors shall be brought through at least 4 ft of metal raceway from fixture to an outlet box at least one foot from the fixture. Such conductors, unless approved for the purpose, shall not extend a distance of more than 6 ft from the fixture as measured along the raceway."

### Other Details

The familiar tubular shaped bulb has an electrode coated with electron-emission material located in each end. Like the incandescent bulb, all air is exhausted, then a mercury vapor-inert air admixture is injected. The inner wall of the bulb is coated with fluorescent material.

The early lamps contained beryllium which has now been eliminated because of the toxic hazard developed as bulbs were broken.

Contrary to popular belief there is no internal electrical connection between the electrodes, but current flows through the space when a high potential is achieved across the electrodes. When the tube "fires" current flows by the medium of the mercury vapor acting as the conductor and the ultra-violet beams generated impinging on the fluorescent powders converts them to visible light.

Two methods are employed in starting the electron flow in the tube. The high potential method is used to start the instant-start hot cathode lamp (it starts with a cold cathode) and the cold cathode lamp. Both electrodes are preheated in the preheat cathode lamp and as a result the electrons "fly-off" with much less effort than if the high potential method is used. The arc thus starts at ordinary line voltage.

Altogether there are three types of lamps available. (A) The preheat cathode type, (B) The instant start

hot-cathode lamp, and (C) the cold-cathode lamp. The starter-ballast combination is a required auxiliary for the preheat cathode lamp. The hot or cold-cathode lamp requires a transformer, but no starter. The transformer is frequently called a "ballast."

Most ballasts consist of a reactor while others employ a combination of reactor and capacitors (condensers). The latter device greatly improves the power factor of the lamp and is usually operated in conjunction with a step-up transformer and compensator which are imbedded in a tar-like compound incased in a metal cabinet mounted atop the fixture.

When insulation failures occur in the above named apparatus, or other abnormal conditions develop, the compound tends to overheat and "boil out." Frequently the fault current is of such small proportions that it fails to open the protective fuse or circuit breaker and under such conditions a combination of explosive vapors and arc may produce a fire.

Some fixtures have the ballast installed within the frame on the inside surface of the top of the unit where any heat generated will radiate out into the surrounding metal. To dissipate this unwanted heat some manufacturers punch holes in the top of the fixture. Sparks or flame may be emitted from this area in the event of insulation failure of the contained apparatus.

Starters are installed in the circuit to perform the preheating function for the electrodes of preheat cathode lamps to provide an ample supply of free electrons required to make possible low-voltage starting. The automatic switch opens the circuit instantly so that the ballast may effectively furnish the voltage peak needed to start the current flowing between the electrodes.

Instant-start hot-cathode lamps operate as "hot-cathode" after being started since the arc heats a portion of the filament-shaped electrode at each end of the tube to a high temperature. Actually, the ballasts or transformers used in all types of fluorescent lamps serve as effective current limiting de-

vices to protect against abnormal peaks in operating voltages.

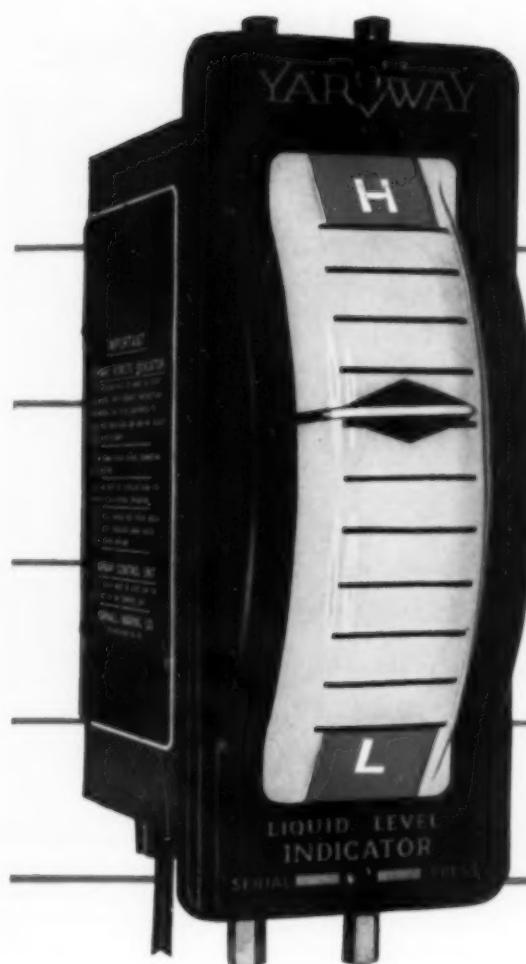
Those fixtures with two or more fluorescent lamps connected in multiple, can use two-lamp, three-lamp or four-lamp ballasts instead of individual ballasts. Two-lamp ballasts far outnumber all other types in general use.

Most everyone is familiar with the flickering caused when a starter is attempting to light a preheat-cathode lamp by building up a high starting load on the ballast. The resulting over-heated condition unless compensated for in the lamp design may ruin the unit. A manual reset type of starter eliminates this handicap by permanently opening the starting circuit after the first few unsuccessful attempts are made to start the lamp up. This feature also helps to prevent failure of the starter unit.

Repeated attempts to start the lamp do not occur when instant starting is employed for hot-cathode or cold-cathode lamps. The instant-start ballast or transformer produces high peak voltages ranging from 700 to 900 volts with 750 volts being employed for the hot-cathode, and 850 to 950 volts for the cold-cathode multiple lamps. Once started the lamp then operates at line voltage.

Fluorescent fixtures may be connected in multiple or in series yet the preheat cathode lamps are ordinarily connected in multiple. Late developments employ transformers with an output voltage of 15,000 volts to energize several cold cathodes wired in series. Unlike the ordinary types of fixtures the new units have the transformers mounted individually near the fixture. The short runs of high voltage lines must be armour clad and well insulated.

Some idea of the seriousness of inadequate wiring preparations can be gained from the fact that in a fruit-packing plant employing high-voltage lamps water seeped in through a defective roof to soak into the lamp equipment. The resulting fire caused a loss of approximately \$2,000,000 where a series of connecting mishaps and failure of the human element added to the confusion.



Yarway Remote Hi-Lo  
Alarm Signals—lights or  
horns—can be used with  
Yarway Remote Liquid  
Level Indicator and  
placed at any location  
in the plant.

boiler water

levels now

easier to see...

easier to read

Whatever the boiler pressure, high or low, YARWAY Remote Indicators give accurate, instant, eye level boiler water level readings at any convenient plant location.

Boiler Code Case No. 1155\* says in part, "... two independent remote level indicators of the compensated manometric type may be used instead of one of two required gage glasses for boiler drum water level indication in the case of power boilers with all drum safety valves set at or above 900 psi . . ."

YARWAY Remote Liquid Level Indicators fill the bill—and feature a "wide vision" face that makes reading easier from any angle.

Accurate—because indicator is actuated by the boiler water itself—by the pressure differential between a constant head and the varying head of water in the boiler drum.

Also use YARWAY Remote Indicators on heaters of various types.

For full description, write for YARWAY Bulletin WG-1824.

\*Write for free reprint of case description.

**YARNALL-WARING COMPANY**

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**YARWAY** REMOTE LIQUID LEVEL INDICATORS

# Air-Supported Warehouse

**Duke Power Company — Pelzer, South Carolina**



No visible means of support — structure weighs 500 pounds, gets light from the sun and costs \$3,600.



**DUKE POWER** Company, the largest utility company south of the Mason and Dixon Line, uses two air supported structures for use as general storage inclosure of utility equipment and building materials in connection with its steam generating plant at Pelzer, South Carolina. C. T. Wanzer is Construction Manager of this Company, which has General Offices at Charlotte, North Carolina.

Each of these low-cost warehouses is 40 ft x 80 ft and was delivered complete with blower and 4 ft x 8 ft wood frame door. The fabric is Fiberthin, a white vinyl coated nylon made by U. S. Rubber Company. The storage area is completely unobstructed since the structure is supported entirely by low pressure air. Sand is used as ballast in the tube at the base

which anchors the building to the ground. The warehouses were manufactured by CID Air Structures Company and were supplied through Mill Power Supply Co.

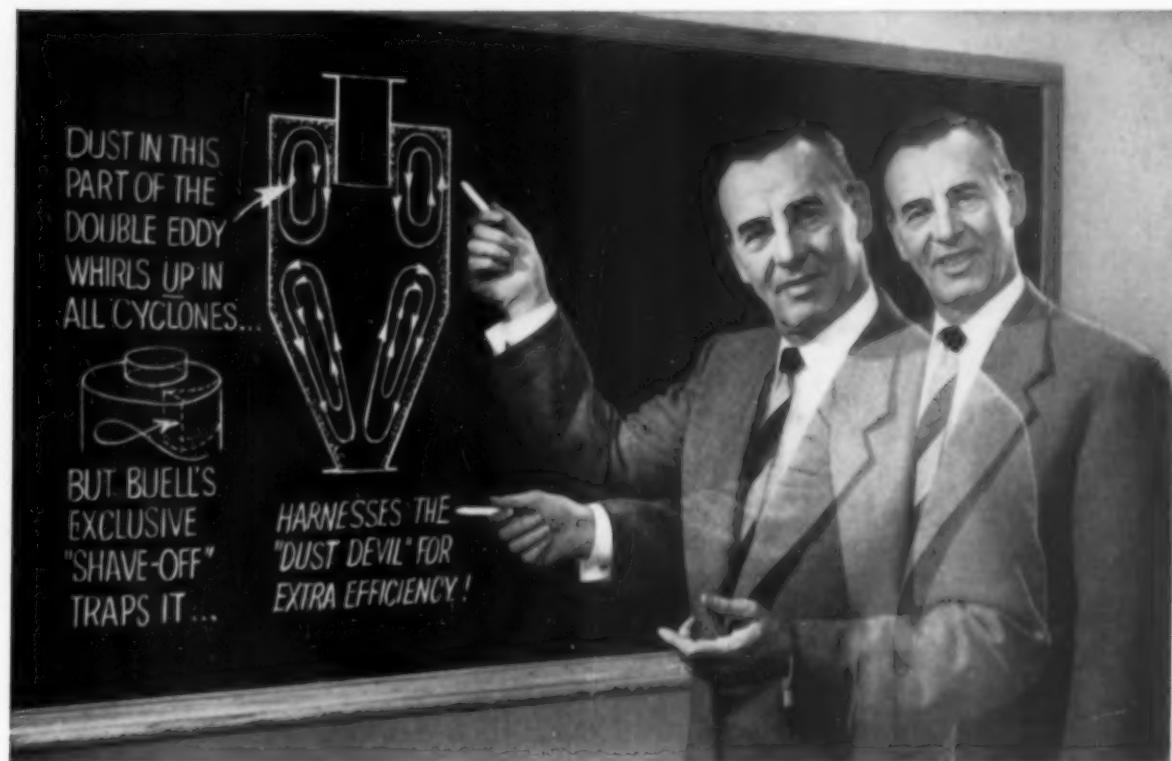
The structure provides all-weather storage area, and can be taken down readily and erected elsewhere if desired. The translucent material permits the entry of sufficient daylight for the usual storage activities within the structure. The blower maintains a constant supply of low-pressure air which "supports the structure even when the swinging door is opened for the entry of fork lift trucks." Larger doors and airlocks are available.

The cost of this unusual structure is only \$1.00 per square foot of floor area, complete with door and blower—ready for use.

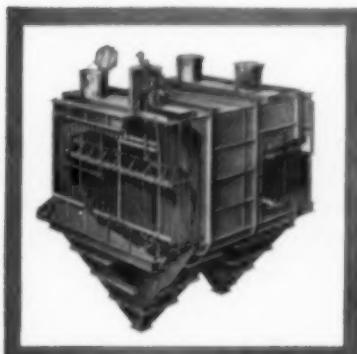
These views show: The complete structure delivered to the job; ready for inflation; and how it looks inside.

The entire structure can be transported in a station wagon and on concrete or dirt surface. The sealed blower runs continuously. Rips can be sealed with special tape, and material is flame resistant. Structure can be heated or air conditioned.

## Mastering the double-eddy dust devil leads to extra dust collection efficiency!



Other design features which increase efficiency include large, clog-proof diameter, proper proportioning for maximum dust separation, extra-heavy-gauge, wear-resistant construction . . . features which shave dust collection costs to the minimum!



Buell SF Electric Precipitator also delivers *extra dust collection efficiency*, due to unique Spiralelectrodes and Continuous Cycle Rapping.



Buell Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for either natural or mechanical draft installations.



For more specific data about Buell's *extra efficiency*, write Dept. 89-B, Buell Engineering Company, 70 Pine St., New York 5, N. Y.

**buell**®



**Experts at delivering Extra Efficiency in DUST COLLECTION SYSTEMS**

# THE MODERNIZATION OF

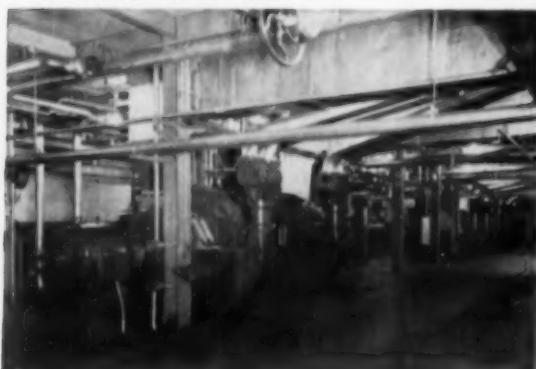
gives *Western Electric Company*  
more power per worker at 40% less cost  
and an annual savings of \$500,000



Before Modernization — Sixteen traveling grate fired units that were replaced by three Riley Units.



After Modernization — Firing Aisle of new Riley installations that feature Riley Flare Type Burners.

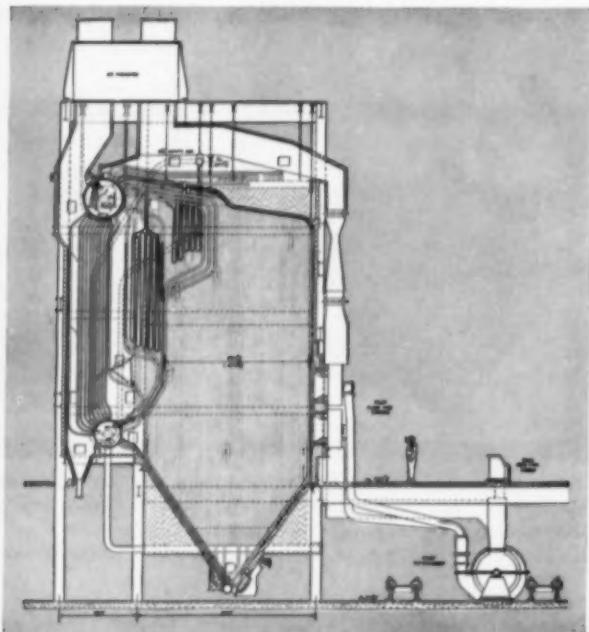


Six Riley "50" Pulverizers assure sustained high fineness of the Illinois and Indiana coals used at Hawthorne. Riley Pulverizers are noted for their quiet vibrationless operation and their ability to operate efficiently with the wettest coals.

When faced with a continually increasing annual expense for energy production in relation to number of workers, officials at Western Electric Company's Hawthorne Works at Chicago, Illinois decided that investment in modernization was needed. Their final selection of equipment was based on facts developed in exhaustive studies of heat cycle and labor costs.

The three Riley 150,000 lbs/hr. Units that were installed, replacing sixteen small boilers, are equipped to burn coal, oil or gas to supply steam for all manufacturing and plant services independent of outside sources. The services are distributed as steam, electric power, compressed air and hot water for space heating.

UNITED ENGINEERS & CONSTRUCTORS, INC.  
CONSULTING ENGINEERS



The three 150,000 lb/hr. Riley Units at Hawthorne feature patented Single Header Hopper Bottoms. Furnace is designed for coals with ash fusion temperatures as low as 1900 F. Steam Pressure 1800 psig., temperature 835 F.

# HAWTHORNE POWER PLANT



Since completion of modernization, operating results thoroughly justify Western Electric Company's findings and the amount of its investment:

#### HIGHER EFFICIENCY

Three 150,000 lbs/hr. Riley Boilers that replaced sixteen old units operate at efficiencies of 85% as against 67%.

#### LOWER FUEL COST

Cost of fuel has been reduced 40%; coal used has been Southern Illinois or Indiana carbon and screenings with no difficulties experienced with ash removal and furnace slagging; furnaces stay clean even when ash fusion temperatures are as low as 2000° F.

#### HIGH AVAILABILITY

Each unit rated at 200,000 lbs/hr. peak capacity has operated successfully as high as 240,000 lbs/hr. in tests and has been available 98% of the time.

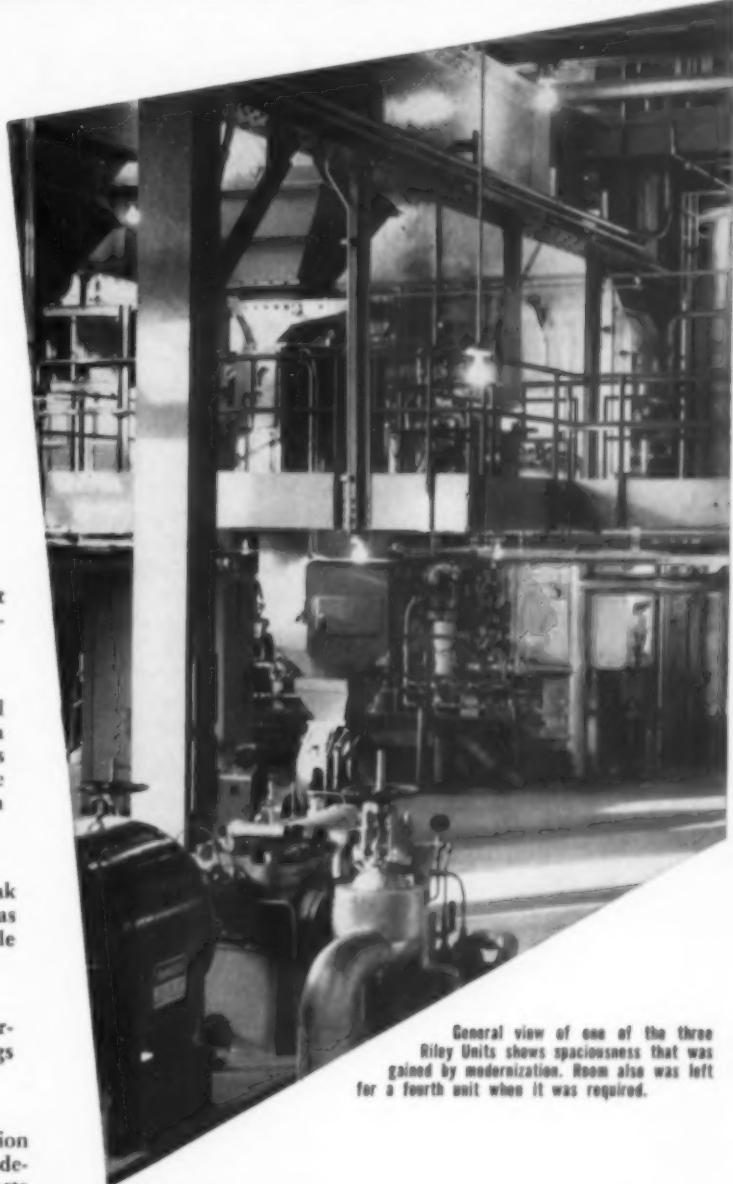
#### LOWER OPERATING COSTS

A 50% reduction in plant operating personnel was effected with maintenance savings amounting to \$100,000 annually.

#### INCREASED SAVINGS

Basis for modernization was a production level equivalent to 23,000 kw maximum demand and 45% load factor. Recent reports show demand at 26,000 kw with 48% load factor, resulting in a total annual savings after fixed charges of over \$500,000.

THESE FACTS PROVE that it pays to modernize . . . and with Riley Steam Generating and Fuel Burning Equipment. Furthermore . . . of the seventeen recipients of POWER'S Modernization Awards of 1954 and 1955, seven featured Riley Units complete with Riley Fuel Burning Equipment. They are: Western Electric Co., Iowa-Illinois Gas and Electric Co., Bendix Aviation Corp., Carbide and Carbon Chemicals Co., Garlock Packing Co., The Flintkote Co. and Pennsylvania R. R. Company. In the 1956 contest both Allis-Chalmers and Thomas A. Edison Co. joined the ranks.



General view of one of the three Riley Units shows spaciousness that was gained by modernization. Room also was left for a fourth unit when it was required.



A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

**RILEY**  
*Stoker Corporation*  
WORCESTER, MASSACHUSETTS

Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.

# **Effective Feedwater Treatment**

**MANUFACTURERS** recognize the necessity of distributing feedwater in a boiler at a location which will assure satisfactory circulation and proper chemical conditioning. Water Treatment consultants appreciate the advantages obtained by introducing chemical treatment continuously at a specific location to a steam generating system, and by blowing down a small portion of boiler water continuously from a boiler.

## **Feedwater Distribution**

Several conditions may cause hardness salts in feedwater and boiler water to deposit on metal surfaces. Temperature, the presence or absence of certain constituents in the water, heat distribution, etc., are factors.

Deposit problems frequently develop in internal economizers. Because of this, some designers distribute feedwater direct into boil-

**By J. S. BEECHER**

Chief Chemist  
E. F. Drew & Co., Inc.

er water without directing the feedwater through an integral economizer. Often when experience proves that deposits occur in certain types of boilers designed to include integral economizers, modifications have to be made.

The integral economizer sections of some boilers are so designed that by the removal of baffles, the economizer can be converted to downcomer tubes containing a mixture of feedwater and boiler water. Modifications of this type are frequently necessary when poor quality feedwater is used.

The water circulating in a boiler must be properly conditioned before entering the downcomer tubes.

Distributing feedwater too close to downcomer tubes may cause deposits. Therefore, both circulation and water problems require consideration.

The ASTM Committee D-19 on Industrial Water (ASTM Designation: D1129-54) defines boiler water as follows:

"a term construed to mean a representative sample of the circulating boiler water, after the generated steam has been separated and before the incoming feedwater or added chemicals become mixed with it so that its composition is affected."

Experience has proved that feedwater and boiler water should be well mixed before the water enters the downcomers. Most designers equip boilers with a properly sized and located perforated feedwater line for proper distribution of feedwater. Figure 1 illustrates typical locations of feedwater lines in several types of boilers.

## **Chemical Feed Distribution**

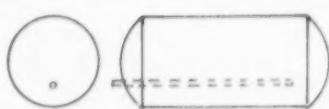
The location and method for distributing chemical treatment depend upon several factors, such as type of boiler, quality of the make-up water, amount of condensed steam recovered for re-use in the boiler, and operating conditions.

Where good quality makeup water is available and a large amount of condensed steam is recovered for re-use in boilers, satisfactory results may possibly be obtained by feeding chemical treatment intermittently into the preboiler section. However, a more desirable arrangement for feeding chemical treatment is as follows:

1. Feed sodium sulfite and any alkali needed to prevent preboiler section corrosion, continuously to the preboiler section. If an organic sludge conditioner is employed, feed it along with the sodium sulfite and alkali.

2. Feed phosphate and any al-

CRUSS DRUM STRAIGHT TUBE BOILER



THREE DRUM BENT TUBE BOILER, ONE TOP STEAM DRUM, TWO LOWER WATER DRUMS

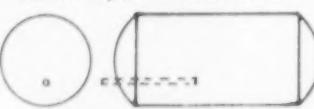


FIGURE 1 — TYPICAL LOCATIONS OF INTERNAL FEEDWATER LINES

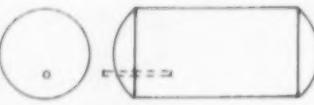
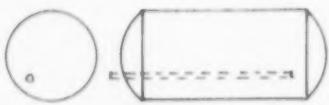


FIGURE 2 — TYPICAL LOCATIONS OF INTERNAL CHEMICAL FEEDLINES

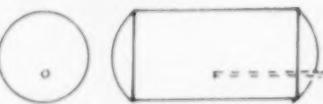
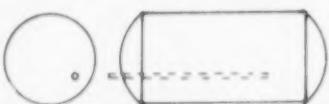


FIGURE 3 — TYPICAL LOCATIONS OF INTERNAL CONTINUOUS BLOWDOWN LINES

## Feedwater and chemical distribution and blow-down require consideration for successful internal boiler water treatment for water tube boilers

alkali not needed for preboiler section corrosion control continuously direct to boilers through a properly sized and located internal chemical feedline. Feed sodium silicate and sodium nitrate, if employed for treatment, along with the phosphate and alkali.

Feeding chemical treatment continuously to a steam generating system is desirable for several reasons, such as:

1. Chemical treatment may be fed at a location where the desired mixing of treatment with feedwater and boiler water is obtained.

2. Relatively uniform chemical conditions can be maintained in the circulating water.

3. The danger of objectionable undertreatment or overtreatment is practically eliminated.

Many boiler designers recognize the advantages obtained by feeding treatment continuously direct to a boiler and specify a properly sized and located internal continuous chemical feedline.

Figure 2 illustrates typical locations of internal continuous chemical feedlines in several types of boilers.

### Blowdown

Where a good quality makeup water is available, where a large amount of condensed steam is recovered for re-use in a boiler, and where load conditions are not severe, intermittent manual blowdown may be satisfactory.

Generally, advantages are obtained by removing a small portion of boiler water (refer to definition of boiler water given in a previous section) continuously from a specific location in a boiler. When continuous blowdown is employed, several short intermittent manual blowdowns are recommended.

Several advantages are obtained by the employment of continuous blowdown, such as:

1. The total solids or any specific constituents of the boiler water can be uniformly regulated.

2. Uniform control over chemical treatment can be maintained.

3. Boiler water may be removed from a boiler even though load conditions are severe.

Many boiler designers realize the advantages obtained by the employment of continuous blowdown and specify a properly sized and located internal continuous blowdown line.

Figure 3 illustrates typical locations of internal continuous blowdown lines in several types of boilers.

The location at which feedwater

is distributed in a boiler is important not only from a circulation standpoint but also from a water treatment standpoint. Important advantages are obtained by continuously distributing chemical treatment to the proper location in a steam generating system and by removing a small portion of boiler water continuously from a boiler.

During the past, many boilers, not equipped with an internal continuous chemical feedline and an internal continuous blowdown line, have been installed. In those installations where water conditions indicate the desirability of feeding chemical treatment direct to the boiler and of blowing down the boiler continuously, certain manufacturers cooperate with water consultants in supplying recommendations for the sizing and locations of the required internal lines.

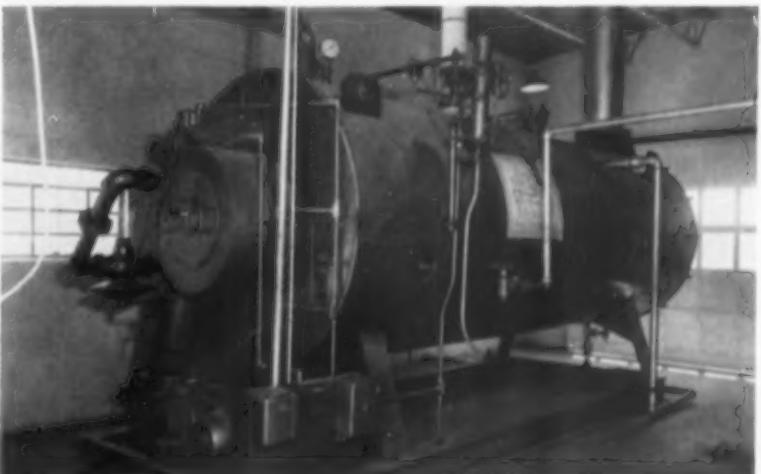
## Steam-Dried Cigars?

**TENNESSEE** Burley-Growers Drying and Storage Corp., Morristown, Tenn., processes tobacco with steam. The steam controls the humidity to the correct texture for long-term storage in hogsheads. Aging is helped by the steam process.

The steam is supplied by a 250-hp high-pressure packaged steam generator (York-Shipley "Steam-Pak") fired by natural gas. The

equipment was sold by the Tennessee Heating Sales Co., Knoxville, and installed by Muse, Inc., Johnson City, Tenn.

After initial start-up and adjustments, no further servicing was required on the packaged equipment. Tennessee Burley Growers is well pleased with the results secured and anticipates using the same make of packaged steam generator in other plants.





*“On a low voltage situation,  
Fusetron dual-element Fuses  
opened and warned us of the need  
for a larger transformer”*

HERMAN BOND, PRES.  
ACME ELECTRIC CO., DENVER, COLO.



**Here's Mr. Bond's own  
story of how Fusetron  
fuses helped solve the  
low voltage situation.**

"A flock of Fusetron dual-element fuses blew one afternoon at the Duffy Bottling Works several weeks after we had completed changing the entire plant to this type of fuse in an effort to eliminate extreme heating in switches and to get more dependable protection.

"Before putting the circuits back in operation we wanted to find out what had caused the Fusetron fuses to open.

"On checking, we learned that a severe voltage drop occurred whenever the plant was in full operation. The trouble was due to the transformer being too small to keep the voltage at its normal value of 220 volts.

"To prevent the trouble recurring, a larger transformer was installed. Since then, they have had no more low voltage difficulty.

"By opening and warning of the need for a larger transformer, Fusetron fuses not only saved Duffy Bottling Works the expense of possible motor burnout, but also prevented costly slowdowns in their production."

You too, can save money throughout the plant by using Fusetron fuses . . . They Provide **10 Point Protection** 1. High interrupting capacity—protect against short circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes. 2. Protect against needless blows caused by excessive heating—lesser resistance results in cooler operation. 3. Protect against needless blows caused by harmless overloads. 4. Provide thermal protection—for panels and switches against damage from heating due to poor contact. 5. Protect against waste of space and money—permit use of proper size switches and panels. 6. Protect motors against burnout from overloads. 7. Give DOUBLE burnout protection to large motors—without extra cost. 8. Protect motors against burnout due to single phasing. 9. Make protection of small motors simple and inexpensive. 10. Protect coils, transformers and solenoids against burnout.

**DON'T RISK LOSSES!** One lost motor . . . one needless shutdown . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing every ordinary fuse with Fusetron dual-element Fuses. Write for Bulletin FIS.

**FOR LOADS ABOVE 600 AMPS.—USE BUSS HI-CAP FUSES  
to coordinate your electrical circuits.**

On 600 volts or less, BUSS Hi-Cap fuses have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuits of origin. Write for Bulletin HCG.

**BUSSMANN MFG. CO. (Div. of McGraw-Edison Co.)**  
University at Jefferson, St. Louis 7, Mo.



# PENALIZED BY PAPER WORK?

*Then Take a Look at GE's Call Box Reporting System*



Now — call box (above) flashes timekeeping, production information to central office. Automated communications save over 1000 ft of floor space, and many man-hours.

**WHEN** a production worker walks into General Electric's Metallurgical Products Department plant, he leans over a call box at his work station and reports his presence, clock time, job number, and operation number.

This information "flashes" into a central office and is immediately key-punched into a tabulating card. Later, when the worker finishes his first job, he again visits the call box and reports what he has accomplished, including details of the new job he is about to tackle. He repeats this procedure every time a work change occurs during the day.

At the end of his shift, the central office automatically balances out his work for the day against his actual clock hours.

This, in essence, is a new automated timekeeping system.

According to L. R. Butler, manager of payroll and timekeeping, who developed the setup, the automatic system already has paid itself off three times over — making an annual saving of about

\$36,000. It immediately released eleven badly-needed workers for other duties, and picked up additional man-hours by eliminating "travel and waiting time" required under the old timekeeping method.

Most important, he pointed out, the system today provides a faster flow of accumulated information to the organization's accounting departments and management.

The new system is a radical departure from the old procedure which required the services of 18 timekeepers, "sprinkled" throughout the plant in various departments.

The old procedure also required the worker to personally check "in and out" with his timekeeper five or more times during his working day. In reporting a work change, the employee also lost a certain amount of productive time.

According to P. J. Jensen, Metallurgical Department manager of manufacturing, "this is one instance of how 'paper-work' or office automation reaches out as

a management tool to help the production worker.

"In this instance," he says, "the system not only helped us find additional manpower within the company for productive work, but eventually, it will pin-point those production variables which crop up to hinder a production worker from turning out a creditable day's work.

"We know from the 28 years we have been in the cemented carbide producing game what can be expected of our people. But we never seemed to have sufficient information quickly enough on those mechanical variables that come up to plague a worker attempting to turn out a good day's work.

"A malfunctioning press, or a tempermental furnace, where the workers have to expend considerable effort is not fair to the employees. With the information provided by the new system, we can quickly pin-point these variables without penalizing the worker or questioning his abilities."



# EUTECTIC

PLANT, RESEARCH LABORATORIES  
and WORLD HEADQUARTERS



Published by EUTECTIC WELDING ALLOYS CORPORATION 40-40 172nd STREET, FLUSHING 58, NEW YORK, N.Y.

## XYRON 2-25 REPAIRS RR DIESEL ENGINE SAVES \$10,800, WEEKS OF DOWNTIME

A large break in the first cylinder of a 600 horsepower diesel engine almost resulted in the loss of \$10,800 by a Midwestern railroad. Attempts to repair the engine with conventional high heat welding materials failed because the block was thoroughly dirt and oil soaked and its tremendous size made pre-heating impossible.

The railroad's maintenance foreman was ready to recommend scrapping the engine when Eutectic's District Engineer suggested welding with patented Xyron 2-25, "Eutectic's" newest and most advanced electrode for all types of grey and alloyed cast iron.



Fig. 1

Yron 2-25, "Eutectic's" newest and most advanced electrode for all types of grey and alloyed cast iron. Xyron 2-25 is usable fast and cold and is the first non-cracking, porosity free, all position electrode for cast iron.

Repair was begun by veing out all broken surfaces with Eutec-Chamfer-Trode, high speed gouging electrode for all metals. (Fig. 1) Gouging with ChamferTrode provided a good surface for deposits of Xyron 2-25 and burnt out many of the impurities in the casting. After the broken parts were reassembled on the engine block, Xyron 2-25 was used to tack weld. (Fig. 2).



Fig. 2

Welding machine was set at 100 amps, DC reversed. The welder then used a stringer technique with short arc to deposit 2" passes of Xyron 2-25. Peening after each pass relieved stress and slag was easily removed.

Final results were excellent. Xyron 2-25 produced dense, smooth, porosity free deposits at lowest amperages. (Fig. 3) Fast repair with Xyron 2-25 saved railroad \$10,800 replacement cost and avoided weeks of downtime.



(A-71)

### HIGHEST STRENGTH JOINTS WITH EUTECTRODE 201



Welded with patented EutecTrode 2101, the aluminum tine joints on this cement block unloader are up to three times stronger than joints of conventional aluminum electrodes. Loads of close to a ton cause the tines to dip as much as eight inches without cracking. EutecTrode 2101 quickly fabricated the block unloader, produced smooth solid deposits with good color match and high resistance to corrosion. The first aluminum electrode with an extruded flux coating, EutecTrode 2101 does not spatter or fume, produces a quiet arc at lowest amperages. EutecTrode 2101 outperforms all conventional aluminum electrodes. (A-72)

### EUTECTRODE 680 AC-DC AVERTS 10 WEEK STOPPAGE



A Tennessee stamping plant faced an 8-10 week production stoppage because of a cracked shaft on a 340 ton press. Replacement was estimated at \$15,000. But downtime was averted and replacement cost saved by using EutecTrode 680 AC-DC and Eutec-ChamferTrode to repair the shaft at a cost of only \$37 in materials. Eutec-ChamferTrode, high speed gouging electrode, was first used to veing out the crack, which extended 6" through the 12" shaft. EutecTrode 680, patented high tensile electrode for very high alloy and carbon steels, was then applied. EutecTrode 680 welds were applied at lowest amperages. (A-73)

(A-73)

# Welding News



In answering Industry's requests for technical data, Eutectic's research and engineering staffs help industry save thousands of dollars each year. Your questions, like those below, will be answered without obligation by Eutectic's Technical Information Service.

Q. My company's welding manual makes reference to the use of solder in the repair of lamp socket contacts. EutecRod 157 with EutecFlux 157 was recommended to us for this application. Will you advise? We would like to incorporate this information in our manual for future use. The fact that this soldering is performed by unskilled personnel should be considered.

A. EutecRod 157 is considered an ideal recommendation. Since this alloy has an extremely narrow plastic range, rapid solidification takes place, assuring a good build-up. It is therefore easier to handle by the unskilled. Deposits are harder and have higher electrical conductivity than conventional solders. This means greater resistances to pitting and general wear. Since the alloy has a higher solidus temperature, the possibility of plasticizing the build-up if accidental arcing occurs is virtually eliminated. Contacts also will remain bright and clean since EutecRod 157 does not contain lead or other elements than darken with age. Melting point is approximately 430° F. Electrical conductivity is 18 percent.

Q. What is the electrical resistance of EutecRods 180, 800, and 1804?

A. Electrical resistivity of all three is almost identical in that values of 23/24 microhms per cubic centimeter are obtained on all tests.



Eutectic Warehouse - Service Centers  
446 Northside Drive, N.W., Atlanta 18, Ga.  
2204 Irving Boulevard, Dallas 7, Texas

Eutectic Welding Alloys Corporation  
40-40 172nd Street, Flushing 58, N.Y.

Gentlemen:

I would like further free information on the following:

A-71       A-72       A-73  
 Free 170 page pocket Welding Data Book

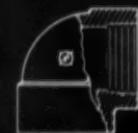
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“EUTECTIC” WELDING HEADLINES • TIME - MONEY - MACHINERY SAVERS

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SOCKET TYPE ELBOW

A complete line of Walworth screwed and solvent weld socket type fittings are available in sizes from  $\frac{1}{2}$ " to 4" and include 45° and 90° Ells and Tees . . . flanges . . . plugs . . . bushings . . . straight and reducing couplings . . . screwed and flanged unions . . . caps . . . nipples.

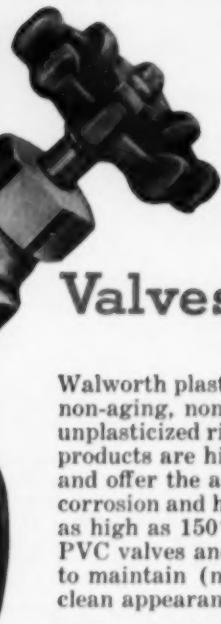
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SUBSIDIARIES: **ALLOY CO.** ALLOY STEEL PRODUCTS CO. **CONOFLOW** CONOFLOW CORPORATION **GROVE** GROVE VALVE & REGULATOR CO.  
**SW** SOUTHWEST FABRICATING & WELDING CO., INC. **M & H** M & H VALVE & FITTINGS CO. **WALWORTH** WALWORTH COMPANY OF CANADA, LTD.

## FOR THE LASTING PROTECTION OF PLASTIC PIPING SYSTEMS....



Specify  
**WALWORTH**  
**PVC**  
(rigid polyvinyl chloride)  
Valves and Fittings!

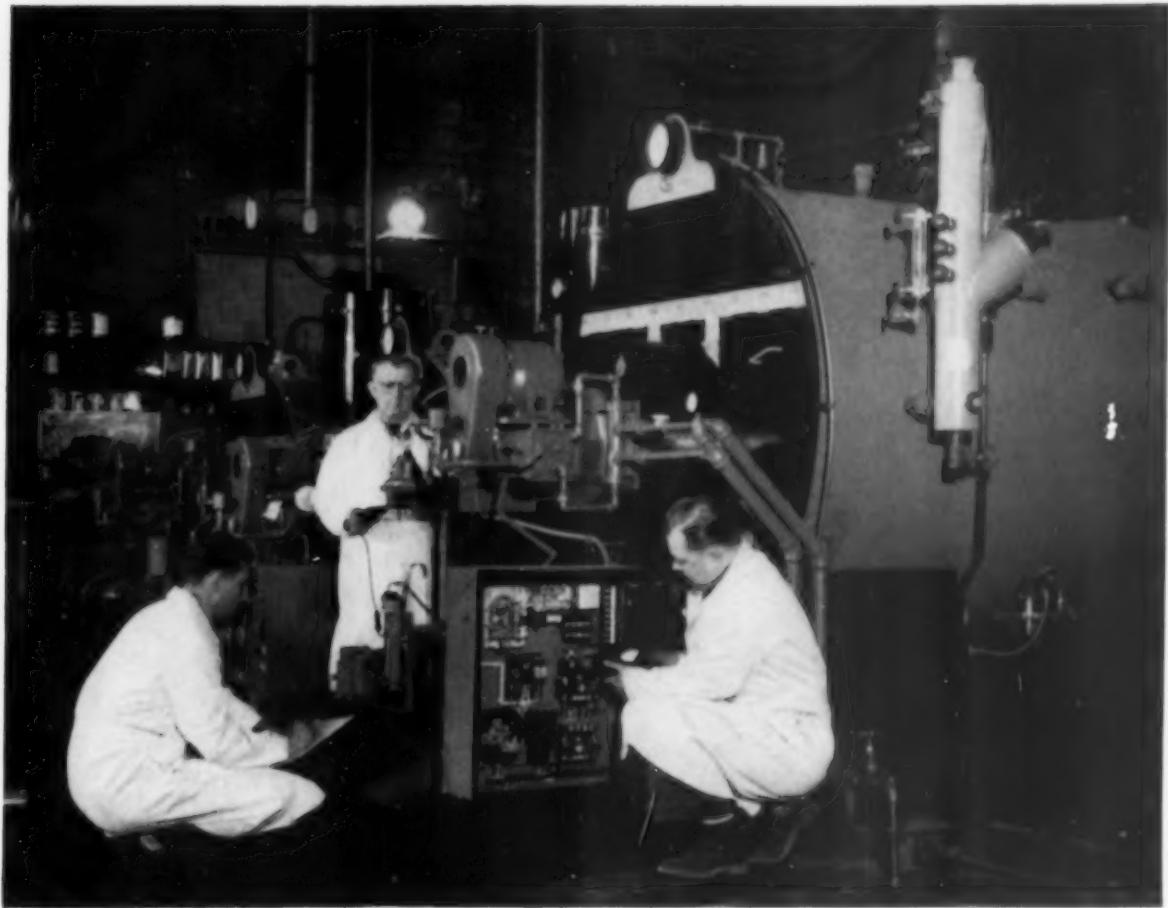
Walworth plastic valves and fittings are made of non-aging, non-corrosive and non-toxic unplasticized rigid polyvinyl chloride (PVC). These products are highly resistant to chemical attack and offer the advantages of immunity to galvanic corrosion and high impact strength at temperatures as high as 150°F. Durable and light, Walworth PVC valves and fittings are simple to install, easy to maintain (no painting), and add a smooth, clean appearance to your piping system.

Walworth PVC Y-Globe Valves are designed to regulate the flow of alkalies, acids, and similar corrosive fluids. Walworth PVC Diaphragm Valves\* are commonly used in systems handling corrosive fluids, especially those containing suspended materials, and can be furnished with diaphragms suited to your application.

\*Hills - McCanna (Sounders Patent)

SEND FOR THIS BOOKLET. It describes mechanical and thermal properties, working pressures, sizes and dimensions, application and assembly data for the complete line of Walworth PVC Valves and Fittings. Please use company letterhead.





## factory fire testing... cuts installation costs for Superior Steam Generators

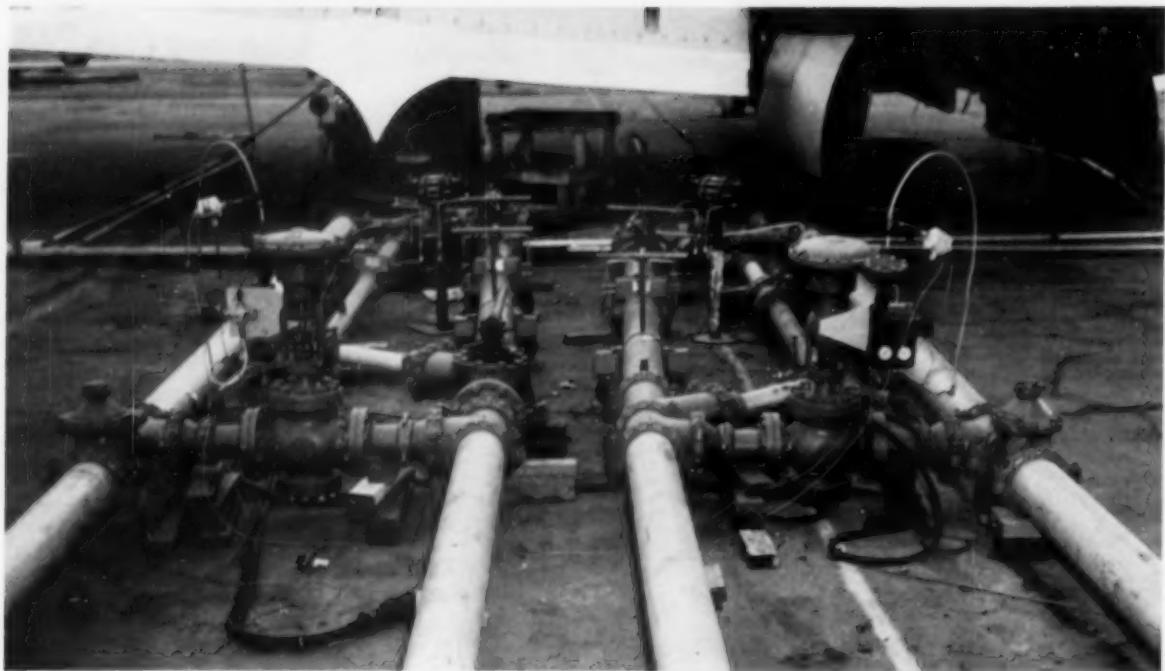
When specifications call for "all equipment installed and left in first class operating condition", it pays to install Superior Steam Generators. Fully integrated units including boiler, burner and controls, with all interconnecting piping and wiring completed at the factory, Superior Steam Generators are ready to go to work as soon as tied in to steam, water, fuel and electric lines.

And there are no "bugs" in Superior Steam Generators. Completely fire tested at the factory before shipment, and started on the job by a factory trained expert, they are your best assurance of a clean, trouble-free installation. For complete details on sizes from 20 to 600 b.h.p. for pressures to 250 p.s.i. or for hot water, write today for Bulletin 811F.

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**SUPERIOR**  
STEAM GENERATORS



## Hydraulic Surge Eliminated

***With Pressure Switch and Solenoid Valve . . .***

**AN INSTALLATION** at Hayes Aircraft Corporation, Birmingham, Alabama, for ground testing of aerial refueling systems in KB-50 and KC-97 tanker planes was designed around Leslie pressure controllers to be used to reduce and control the pressure from the main pumping units.

Jet fuel is pumped at a pressure of approximately 125 psig and must be reduced and controlled to approximately 55 psig at the filling nozzles. Flow up to 1200 gpm is handled through the system, and because of automatic shut-off controls in the planes' tanks, there was a serious hydraulic surge through the system.

This problem was resolved by Gauggel Engineering Company, local representatives for Leslie

Company and Barksdale Valves, through the use of a Barksdale-Meletron pressure switch and a Barksdale solenoid valve in the instrument air circuit to the Leslie diaphragm valve.

When the shut-off occurs at the nozzle, a tendency towards a pressure build-up causes the pressure switch to actuate a solenoid valve, which in turn results in fast bleed of the instrument air from the diaphragm chamber of the diaphragm control valve.

Since the Leslie control valve is located in a by-pass circuit, this results in a rapid response to pressure change tendencies and satisfactorily controls the pressure to the desired setting.

The ground fueling system at Hayes is being expanded to facil-

tate other and more modern aircraft, and the Gauggel Engineering Company, Inc., of Birmingham is working closely with Hayes Aircraft Corporation engineers in this concern.

Hayes Aircraft Corporation is almost entirely a Birmingham-owned company, employing some 8,000 employees, and is engaged in a versatile program of reconditioning, modifying and modernizing military aircraft.

Their present program calls for major overhaul and modification of B-25 aircraft, C-119 "Flying Box-cars," KC-97 boom-type tankers and B-50 Superfortresses. Some of the B-50's are being converted to KB-50 tankers capable of simultaneously refueling three jet planes in flight.



Fairbanks-Morse fire pumps provide 12,000 gpm. of water at 100 psi. for each of two systems.

**World's largest  
jet aircraft center  
protected by F-M fire pumps**

Four major aircraft companies—Lockheed, North American, Convair and Northrop—use the 5000-acre U. S. Air Force Plant No. 52 at Palmdale, Calif., for assembly and testing.

Maximum protection against fire at this gigantic operation was achieved at minimum cost by installing two identical, interlocking water supply systems, each equipped with Fairbanks-Morse pumps for both water supply and sprinkler pressure.

The size and scope of this installation indicate Fairbanks-Morse's ability to supply fire pumps for all magnitudes of industrial and municipal requirements. Whatever your needs in fire protection—big installations or small—your Fairbanks-Morse Field Engineer will be glad to work with your own engineers, in specifying the most efficient equipment. Call him today, or write Fairbanks, Morse & Co., Dept. SPI-6, 600 So. Michigan Ave., Chicago 5, Ill.



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## Basic Lessons on Plant Application of Pumps

### Net Positive Suction Head

# N P S H

Part 4 — Design and performance factors influencing the NPSH required by modern centrifugal pumps

**MODERN** centrifugal pumping equipment is more an evolution of practical experimentation than the result of elaborate mathematical theory. While the theoretical considerations result in certain basic formulae and furnish a background for practice, they are quite limited.

Each pump design is individualistic in performance and quite dependent upon the practical skill of the designer for success. Each designer has his own correction factors to apply to the basic equations, all dependent upon his own experience. These factors are infinite in number and are completely dependent upon the geometrical and dynamic properties of the particular design. This would seem to indicate a quite chaotic confusion from which no order could be derived. Luckily this is not the case.

All centrifugal pump designs, regardless of the differences of experience of the designers, have basic similarities of performance which permit a definite classification of design and analysis of performance. We may thus analyze any centrifugal pump from these basic similarities and accurately determine the performance of a pump on any application.

All centrifugal pumps are similar in that they require a rotating runner or impeller of one type or another which imparts dynamic energy to a fluid. Since the impeller is rotating, the basic force involved is centrifugal force; hence the name "centrifugal pump." Because the resultant energy of this rotating impeller is pure velocity or kinetic energy, it must be converted to pressure or potential

energy to be most useful in transporting fluids to both height and distance.

To accomplish this, a casing is built around the impeller with a diverging passageway which converts the velocity energy of the fluid leaving the impeller to pressure energy. At the discharge opening from this casing, this conversion has been completed. A pressure gauge at this position will read the pressure or "head" developed by this pump.

The rate of flow of liquid through the pump is most commonly measured in gallons per minute. For any fixed impeller and casing combination, the passageway areas are constant. As the rate of flow increases through these fixed areas, the velocities also increase. Consequently friction losses increase and conversion of velocity energy to pressure energy or head is less complete because the velocity head required for flow within the pump must be maintained.

The net result is a decrease in head as the capacity through the pump increases so that under stable conditions each head reading can exist with only one capacity reading. A plot of these head-capacity readings results in a curve which is hyperbolic in nature and is characteristic of all centrifugal pumps of this construction.

It then follows that each head

capacity condition will determine fixed power and efficiency values which over the range of head-capacity performance will plot definite power and efficiency curves, also hyperbolic in nature and characteristic of all centrifugal pumps of this construction. These curves are called the "characteristic performance curves" of centrifugal pumps of similar design.

#### Performance Curves

**1. Steep Characteristic:** This term applies to a head capacity curve which has a very sloping characteristic in which a drop in head is accompanied by a relatively small increase of capacity. (See illustration)

**2. Sloping Characteristic:** Has the same general definition as a steep characteristic but does not have as great a loss of head for the same increase of capacity. (See illustration)

**3. Flat Characteristic:** A head-capacity characteristic wherein a considerable increase in capacity does not result in an appreciable drop in head. (See illustration)

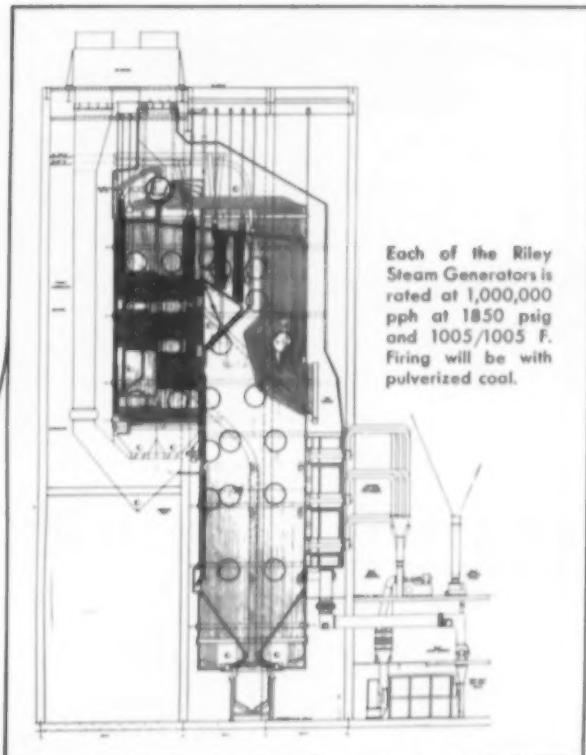
**4. An Unstable Characteristic:** A curve which first rises in head from 0 capacity or increases head as capacity from 0 increases and then at some point continues with one of the other types of characteristics. This curve is called unstable because there are two capacity readings for the same head

# It's Vulcan Selective Sequence at New Albany Generating Station

Boiler cleaning systems for Units 1 and 2 in the New Albany Station of Public Service Company of Indiana will be under Vulcan Selective-Sequence Control. Each of the two Riley Steam Generators will be equipped with a Vulcan Soot Blowing System which includes Long Retracts and Wall Deslaggers.

Selective-Sequence operation of the soot blowing system was chosen to give positive operation at proper intervals in precisely the sequence necessary for the most effective cleaning. Vulcan Long Retractable Soot Blowers with two motor operation assure maximum coverage with uniform cleaning of all surfaces. Vulcan Wall Deslaggers deliver maximum striking power to drive off slag, assuring high heat-transfer capacity and uniform control of superheat and reheat temperatures.

Modern soot blowing systems, with either automatic-sequential or selective-sequence control, can help keep your boilers operating at peak efficiency. Whether your boiler is power or process, large or small, investigate Vulcan Automatic Soot Blowing Systems for better cleaning results.



The Vulcan long retractable soot blowers will have electric drive and will blow with air.

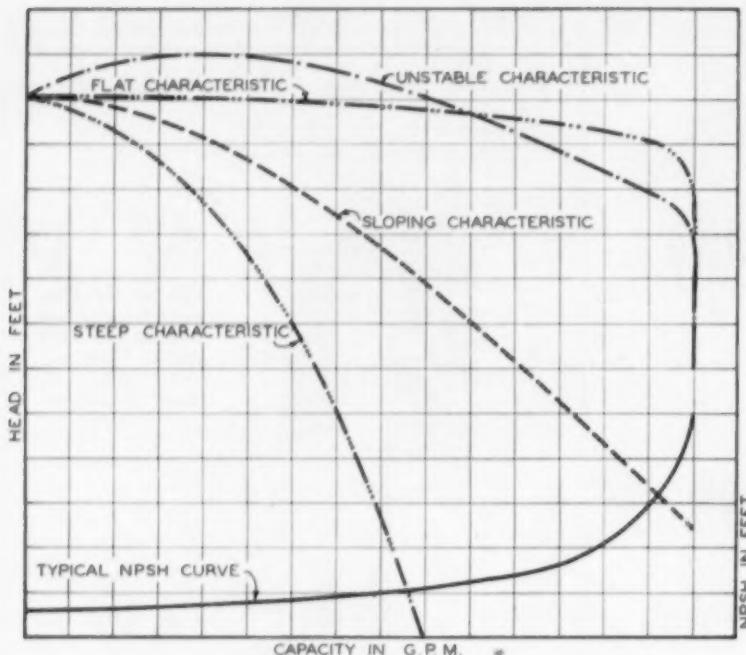


Full cleaning action is assured by the high striking power of Vulcan Wall Deslaggers.



**COPES-VULCAN DIVISION**  
**BLAW-KNOX COMPANY**  
 ERIE 4, PENNSYLVANIA





Characteristics performance curves

condition through part of the operating range of the pump. In some applications the pump will "surge" or cycle between these two capacities and shut-off head. (See illustration)

These are the performance characteristics most important to the successful application of a particular pump to a particular job. A sloping characteristic is most desirable for the greatest number of applications. A steep characteristic is most desirable for applications where a great head variation is expected as in boiler feed installations. A flat characteristic is desirable where the head must be maintained over a great range of capacity. An unstable characteristic is the usual result of a design where maximum capacity must be obtained from a fixed pump size at best economy.

The selection of a pump with an unstable curve should always be made at a head lower than the shut-off head. This places the operation to the far right of the curve where the suction conditions are most critical and therefore the pump is pretty much limited to cold liquid application.

The steep head characteristic is most desirable for high temp. liquids and for those applications where suction conditions are most critical as with high suction lifts, low submergence, or low absolute suction pressures. Another advantage of the steep and sloping characteristic is that the horsepower required beyond the normal operating point does not increase as much at increased capacity as do the other types of characteristics.

A normal power curve for the steep and sloping characteristics tends to flatten out after the best efficiency point is reached, resulting in what is commonly called a non-overloading power characteristic which is most desirable to protect the driver from overloading.

#### NPSH Curves

The successful application of any centrifugal pump is very dependent upon its suction conditions. Modern trends in application require higher temperature operation, lower submergence, greater suction lifts, higher operating speeds, and as in process applications higher vacuums on

the pump suction. These conditions make the entrance of fluid into the pump impeller more and more critical.

These critical conditions lead directly to the phenomena of cavitation which beside preventing flow entirely also destroys pump parts in contact with the liquid; And, due to inherent vibration, cavitation destroys shafts, seals and bearings in both the pump and its driver.

After years of experimentation the concept of Net Positive Suction Head was derived to determine whether a pump will operate successfully on a fixed set of conditions. Since all centrifugal pumps operate on similar principles, certain criteria have been established to better enable the pump designer to meet the critical suction problems encountered today.

Most pump performance data is now accompanied by a fourth characteristic curve called an NPSH curve (See illustration) which is a plot of capacity against absolute suction head which in turn is no more than a plot of the absolute pressure or head on the suction of a pump required to permit stable flow. The user of a pump must then insure that this absolute head is available at the place of application.

#### NPSH Formulae

The NPSH required by a pump is dependent upon many variables both of design and manufacture. These variables again are dependent upon the designers own experience and the methods of manufacture. However, similar magnitudes of these variables produce similar results so that reliable formulae may be evolved to accurately predict pump performance.

In turn, the variables which will affect the suction performance of a centrifugal pump as regards the application are also known to a reliable extent, so that a general formula for any suction system may be derived to determine if enough NPSH is available to the pump in order for it to perform

(Continued on Page 76)

# 5 STEPS



## in making an almost indestructible turbine

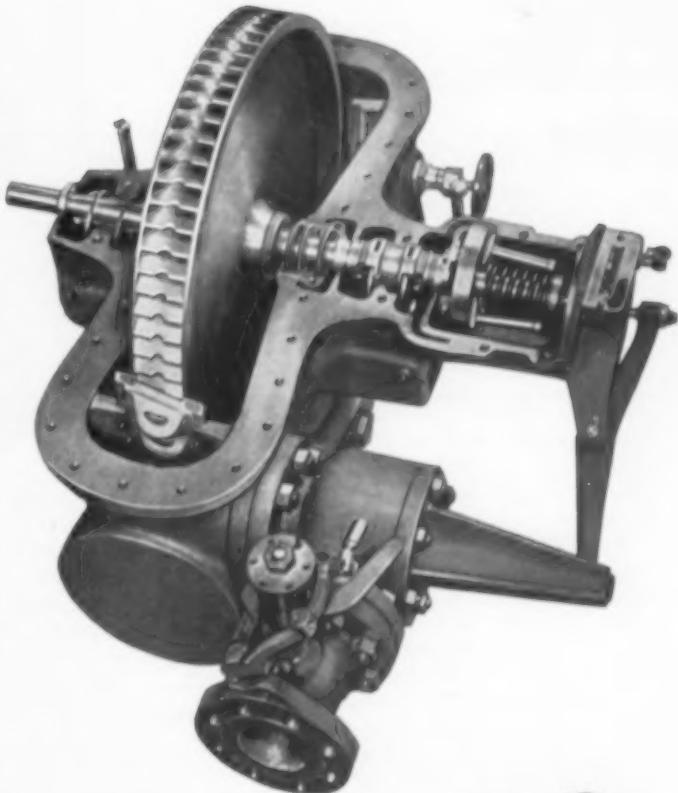
The rotor of a Terry solid-wheel turbine is a single forging of special composition steel. It is first rough turned in two operations, as shown, and then two cuts are taken to mill the semi-circular buckets from the solid metal. The wheel at the top has been finished, ready for mounting on the shaft. *The result is a single-piece wheel with no parts to loosen or wear out.*

Blade wear, which might occur after many years of usage, is not important, because the power-producing action of the steam takes place on the curved surfaces at the backs of the buckets. Thus wear does not materially affect horsepower or efficiency.

The blades can't foul. They have a one-inch clearance, and are further protected by the projecting rims at the sides of the wheel.

The Terry solid-wheel turbine is an extremely reliable piece of equipment. Write for details—today. Ask for a copy of bulletin S-116.

THE  
**TERRY STEAM TURBINE CO.**  
TERRY SQUARE, HARTFORD 1, CONN.



# TERRY

as required. This formula is as follows:

$$(1) \text{ Available NPSH} = H_s \pm H_r - H_f, \text{ where:}$$

$H_s$  = Absolute pressure on surface of liquid. (feet)

$H_r$  = Static difference in level between the surface of the liquid and the pump suction centerline. A positive height is called submergence. A negative height is called a lift. (feet)

$H_f$  = Vapor pressure of the liquid at the pump suction. (feet)

$H_f$  = Friction losses in the suction piping. (feet)

A like formula may be derived for the NPSH required by a pump from test data. This formula as established by the Hydraulic Institute is as follows:

$$(2) \text{ Required NPSH in ft.} = \frac{34}{30 \text{ sg}} (P_b - P_v - P_s) + h$$

where:

$P_b$  = Barometric pressure (inches Hg.)

$P_v$  = Absolute vapor pressure of liquid (inches Hg.)

$P_s$  = Vacuum at pump suction (inches Hg.)

$h$  = Velocity head at pump suction in feet.

Sg = Specific gravity liquid at pumping temperature.

Other factors are constants to convert inches of mercury to feet head.

### Thermodynamics

From the basic equations it is evident that NPSH is entirely dependent upon the thermal conditions at the pump suction. This is understandable when we realize that cavitation itself is a thermal process and dependent upon the flow of heat into the liquid. Cavitation is caused by the liquid absorbing enough Btu of heat to cause vaporization at the impeller inlet tips.

Vapor cavities form in this region of low absolute pressure. As these cavities pass to higher pressure areas at greater diameters in the pump impeller they implode or collapse. The force of this collapse

is great enough to cause grains of metal to be driven out of the impeller passage walls. Of course, noise and vibration also result, the magnitude of both being dependent upon the force and frequency of the collapsing vapor cavities.

The force and frequency of collapse are in turn dependent upon the thermal and pressure conditions both inside and outside the cavity and upon the velocity of flow. It then follows that both the pump impeller suction and the system suction piping must be so designed as to keep the flow velocity as low as practical and to keep the flow of heat into the liquid to a minimum.

Most of the difference between the theoretical maximum energy available at the pump suction and the actual energy of the liquid entering the impeller suction is converted to heat. The losses are primarily friction losses in skin friction and viscous friction in piping, fittings and valves. The friction through elbows, tees, and valves is usually equivalent to several feet of pipe. Therefore, they should be avoided wherever possible.

Since skin friction in piping and valves is dependent upon the velocity of flow, it is evident that suction piping should be as large as practical will permit. Because fittings and valves contribute most of the heat flow into the liquid, they should be placed away from the pump suction entrance so that the extra heat which has been added to the liquid will, at least in part, be dissipated before entering the pump.

Flashing or vaporization can occur only when the flow of heat into a liquid is equivalent to the latent heat of vaporization of the liquid at the existing conditions. Beside avoiding the introduction of heat into the liquid through friction, it is also important where suction conditions are critical to avoid electro-chemical heat flow into the liquid through permitting excessive corrosion of the suction pipe materials by the flowing liquid. Mechanical causes of heat flow into the suction walls should also be avoided such as permitting a

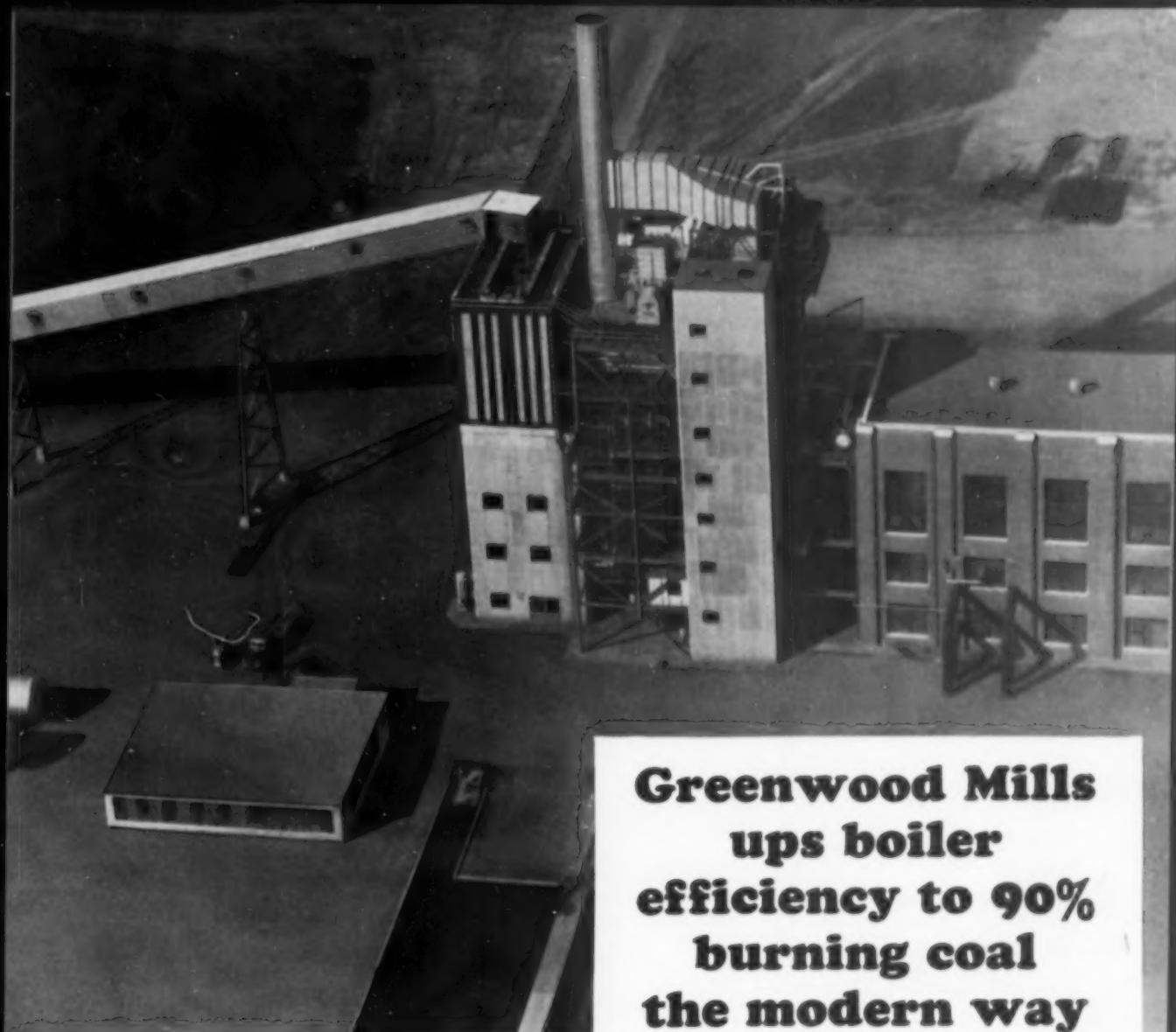
metal to metal contact between the rotating impeller wearing surface, and the mating casing sealing surface or through overly tight stuffing boxes.

In addition to the hydraulic and mechanical considerations of the suction piping, it is perhaps more important to keep the liquid entering the impeller inlet as far above saturation pressure and as far below saturation temperature as feasible. This can be accomplished by keeping the static submergence on the eye of the impeller as great as is practical to keep the absolute suction pressure as high as possible.

Recent experiments (by H. A. Stahl & A. J. Stepanoff ASME Paper 55-A-136) into NPSH against temperature seem to indicate that higher temperature liquids near saturation pressure require less NPSH than lower temperature liquids for the same pump. This has been explained by the fact that the change in enthalpy of the liquid at lower temperatures and saturation pressure makes more Btu available for vaporization for a fixed temperature differential than does the same differential at higher temperatures for a fixed volume of liquid, and a fixed reduction in absolute suction pressure.

For example, the absolute pressure of water at saturation pressure and 70 degrees F is .3631 psia, while at 72 F it is .3886 psia. The difference in pressure would be .0255 psia. For the same 2 F difference in temperature at 210 F to 212 F, a pressure reduction of 14.696 - 14.123 or .573 psia would be required. This means that it requires 22 1/2 times the reduction of absolute pressure at 72 F to make the same 2 F difference in temperature at 212 F.

The enthalpy of water at the saturated liquid state of 70 F is 38.04 Btu/lb. At 72 F the enthalpy is 40.04 Btu/lb. Thus in 2 F differential at this lower temperature 2 Btu/lb is available toward supplying the latent heat of vaporization. As a contrast, at 210 F the enthalpy of the water at saturation pressure is 178.05 Btu/lb while at 212 F the enthalpy is 180.07 Btu/lb — a difference in



## Greenwood Mills ups boiler efficiency to 90% burning coal the modern way

### Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

### facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

When its original power plant could not keep up with growing steam demand, Greenwood Mills, Greenwood, S. C., studied the problem and decided to replace the old facilities.

Greenwood's engineering and construction departments, working with Consulting Engineer Frank Hill of Greenville, designed and built a completely modern power plant. It features a pressurized 300,000 lb./hr. boiler equipped with two cyclone furnaces burning  $\frac{1}{4}$ " x 0" coal. Automatic throughout—from coal conveyors to pneumatic combustion control to hydraulic ash handling—the system is manned by a minimum of operators. Burning coal the modern way has resulted in a trouble-free boiler plant operating at a combustion efficiency of 90% or better.

*For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.*

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2 F of 2.02 Btu/lb toward supplying the latent heat of vaporization.

Between these two temperature conditions, it is seen that the flow of heat is nearly equal. It is then evident that for an equal loss of absolute suction head the lower temperature liquid contributes more Btu/lb toward supplying the latent heat than does the higher temperature liquid, and more liquid would be vaporized at the lower temperature to produce cavitation than at the higher

since the specific volume of the vapor at 72 F is greater than at 212 F.

#### Submergence

From the formula for available NPSH, the minimum submergence can easily be calculated when the NPSH required by the pump and the other suction conditions available are known. As an example, assume that the existing operating conditions are for 212 F at standard barometric conditions then:

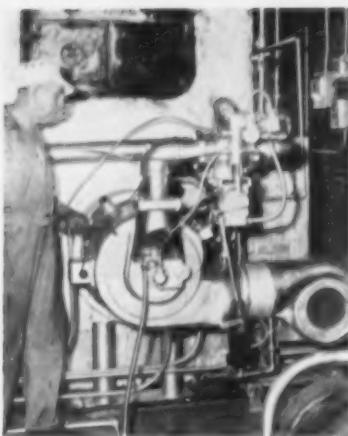
$H_s = 34$  feet abs.  
 $H_r = \text{required submergence}$   
 $H_{sr} = 34$  feet abs.  
 $H_r = 1$  foot  
NPSH required by pump = 6 feet abs.

Transposing equation (1) we obtain:

$$H_r = \text{NPSH (required)} - H_s + H_{sr} + H_r, \text{ or}$$
$$H_r = 6 - 34 + 34 + 1 = + 7 \text{ feet minimum submergence.}$$

Since operating conditions vary somewhat, an additional submergence should be made available.

## Packaged Combustion Assembly



Orr & Sembower packaged conversion burner operating on 125 hp Scotch Marine boiler. Minimum of maintenance is required.

**MAINTENANCE** problems often become apparent when a company's steam and hot water generating equipment suffers from "old age." A practical—and inexpensive—solution to this, when the boiler shell itself is still in good condition, is to replace the old burner unit with a packaged combustion assembly.

Southern Dairies of Atlanta, Georgia did this—with excellent results. According to Mr. Dan Bond, chief engineer of the company, "we had a unit that was giving us maintenance headaches. In the milk field a heating installation is used for production pur-

poses—processing milk, ice cream, skimmed milk, etc.—as well as for comfort heating. This made a solution to our heating problem particularly urgent."

After making a study of possible alternatives, the company purchased a conversion burner made by Orr & Sembower, Inc. This was then hitched to the existing 125 hp Scotch Marine boiler.

The packaged conversion burner assembly included automatic controls, and a forced draft fan. The controls mean that only a minimum of supervision was required. They protected against low water damage, excess pressure, flame failure, motor overloading, short circuits and other hazards.

The controls actually oversee every operation from start until steam is produced. They automatically purge the combustion chamber before ignition and guide the ignition and the supply of fuel. Should a shutdown occur, the blower cleans out the combustion space. The modulating control adjusts fuel and air in just the right ratio, and an automatic water level control governs the supply of water to the steam boiler. Both the pilot and main flame are controlled electronically in the combustion chamber.

The forced draft fan accurately controls the place and quantity of air required for combustion. It makes for better and cleaner combustion, and consequently less

cleaning of the equipment.

"We found we were able to make the conversion installation right in the plant," Mr. Bond said. "We did not have to ship the equipment to the factory."

Since the installation, the heating equipment has been trouble-free.

## Keep Sandpaper Dry

**WHEN YOU** use 40-50,000 sheets per year of 11 x 9, 2/0 sandpaper, plus huge quantities of other sizes and shapes, as they do at Trotter Manufacturing, leading custom woodworking plant, Jacksonville, Florida, it pays to think twice about how to get more life out of each piece.

Experience has shown that localized stocks at various points around the shop is wasteful on two accounts:

1. Accessibility leads to careless use and discarding without full utilization.
2. Dampness severely cuts the life by loosening the adhesives.

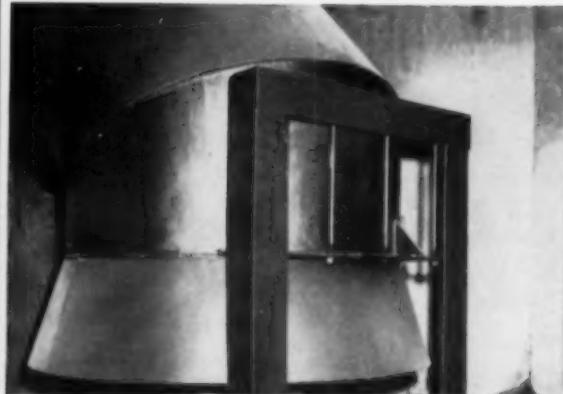
They licked the problem by building a special stock room, lined with celotex and by issuing sandpaper to the shop in small lots. Their purchasing records show they are now getting twice the life with substantially less waste.

By **GEORGE BLACK**  
Jacksonville, Florida



Welder applies the finishing touch to a section of corrosion resistant wrought iron duct slated for shipment to the Orlando Utilities Commission's municipal power plant.

## Wrought Iron provides rugged opposition to corrosion in Orlando, Florida's municipal power plant



This wrought iron surge well outlet presents a formidable defense against corrosion and fatigue stresses at the Orlando powerhouse.

Three hundred sixty tons of durable wrought iron help minimize the threat of corrosion at the Orlando Utilities Commission's municipal power plant.

Here, ducts, tanks, pipe and stack installations of wrought iron are successfully withstanding corrosion. Result is low-cost corrosion control . . . virtually no maintenance or repairs. This material actually pays for itself in years of service rendered.

Reasons why wrought iron brings such permanence to plant facilities appear in our booklet, *The ABC's of Wrought Iron*. Write for your copy. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

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Architects and Engineers: Robert & Co., Associates, Atlanta, Georgia  
Fabricators: Brock & Blevins & Co., Inc., Rossville, Georgia  
J. J. Finnigan Co., Inc., Atlanta, Georgia  
Snyder Tank Co., Birmingham, Alabama

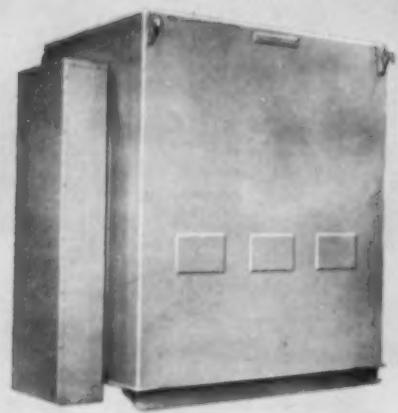
### BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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If your new or modernized plant power system calls for transformers in the range of 501 to 7500 kva, 69 kv and below, you'll benefit from faster, easier installation of General Electric RM medium transformers. The average installation time of these units is only four hours from delivery at the installation site.

RM medium transformers are shipped completely assembled, eliminating the time required for installation of bushings and other accessories which are often shipped separately, in the field. Additional installation time is saved by such outstanding General Electric features as ski-tip bases, extra jacking space, and reversible junction boxes.

## MORE RM MEDIUM TRANSFORMER BENEFITS:

Easier installation is only one of the outstanding benefits you'll receive. Here are more:

**Shorter shipment**—standardization of design and General Electric's repetitive manufacture process cut shipping time to 10 weeks. Voltage ratings and optional features available make these standard units ideal for most industrial applications.

**Reduced maintenance, longer life**—control-center arrangement of instruments, full drain feature and many others help minimize routine inspection time. Quality materials, plus continuous quality control during manufacture, assure greater reliability on the job.

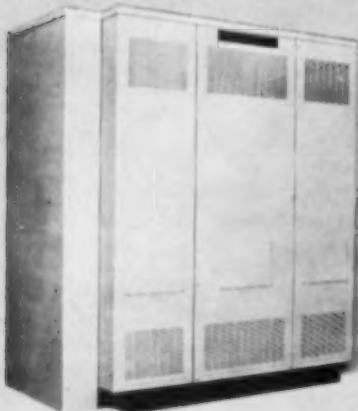
Before you buy a medium transformer, contact your nearest General Electric Apparatus Sales Office. You'll discover how faster shipment, easier installation, reduced maintenance, and longer life add up to more for your transformer dollar. General Electric Company, Schenectady 5, New York.

416-15

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**OPEN DRY-TYPE** transformers, rated 300 to 2000 kva, 15 kv and below, are used in clean, dry, indoor locations where weight or floor space present problems. Light enough to mount overhead!



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\* These same transformers are also incorporated in General Electric's outstanding line of load-center and distribution-center unit substations.

† Reg. Trade-mark of General Electric Company.

# Atomic Trends

# WASTE DISPOSAL at Shippingport

\*Presented at the Second Inservice Training Course on Radioactive Liquid Wastes at the University of Michigan by J. R. La Pointe, Westinghouse Electric Corporation.

\*Abstracted by JOHN F. LEE

Professor of Mechanical Engineering  
North Carolina State College

**FEASIBILITY** of producing electric power from atomic fuel became an established fact on May 31, 1953, when the land-based prototype of the atomic engine for the submarine "Nautilus" produced substantial quantities of power. The application of this principle to the commercial production of electric power will become a reality in 1957 with the completion of the Shippingport Atomic Power Station.

The Shippingport Station will utilize a pressurized water cooled and moderated thermal type heterogeneous reactor. The plant is situated on a 400 acre tract of land, adjacent to the Ohio River in Western Pennsylvania. It is approximately twenty-five air-line miles from Pittsburgh.

The reactor plant consists of four closed piping loops connected in parallel to a single reactor vessel. Each loop contains a steam generator, a single stage centrifugal canned motor pump, 16-inch gate type isolation valves, instrumentation and interconnecting piping. High-purity water pressurized to 2000 psi, serves as both coolant and moderator in this plant. The flow through the nuclear core is 55,000 gpm with a reactor inlet water temperature of 510 F and outlet of 540 F.

The coolant water enters the bottom of the reactor vessel and flows upward between the fuel plates and rods. After having absorbed heat as it goes through

the core, the water leaves the top of the vessel through the outlet nozzles. It then passes through two 16-inch isolation valves in series and flows through many hundreds of small stainless steel tubes in the heat exchanger section of the steam generator. The water then passes through the canned-motor pump and back through the inlet isolation valves to the bottom of the reactor vessel, thus completing the cycle.

Saturated steam is formed from the water surrounding the outside of the tubes in the steam generator. This steam passes upward through risers and enters a steam separator, where moisture is removed and returned to the heat exchanger. The dry and saturated steam is fed to the steam turbine at 600 psia.

## Radioactive Wastes

The source of power at Shippingport is the heat generated by nuclear fission. This heat is continuously removed from the reactor by the recirculation of pressurized water. Although the water is of the highest purity, corrosion of the surfaces it contacts will occur. To reduce the amount of corrosion within the plant, all surfaces in contact with the reactor coolant are constructed of highly corrosion-resistant stainless steels.

The amount of corrosion experienced would be considered small for a conventional power plant.

However, in a reactor power plant these minute quantities of impurities become activated in passing through the reactor core and constitute the source of induced radioactivity.

The reactor coolant can also become contaminated by the leaching of fission products from ruptured fuel elements should such ruptures occur. It is principally this radioactivity that must be successfully disposed of at Shippingport.

Special precautions have been taken to confine the radioactivity within the boundaries of the plant. First the fuel elements, themselves, are encased in hermetically sealed zirconium jackets. The integrity of this barrier is of prime importance for it must contain gross amounts of radioactivity.

Despite rigid manufacturing inspections and closely controlled manufacturing techniques, there is a possibility that a small percentage of the fuel elements might develop small holes. Then a portion of the fission products contained therein would be released to the coolant.

The second barrier to the release of these fission products to the environment is the plant piping which is designed for 2500 psi for operation at 2000 psi. Rigid inspection and construction techniques are followed to insure that the leakage from the system is held to an absolute minimum. The



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**JEFFREY**  
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needs?

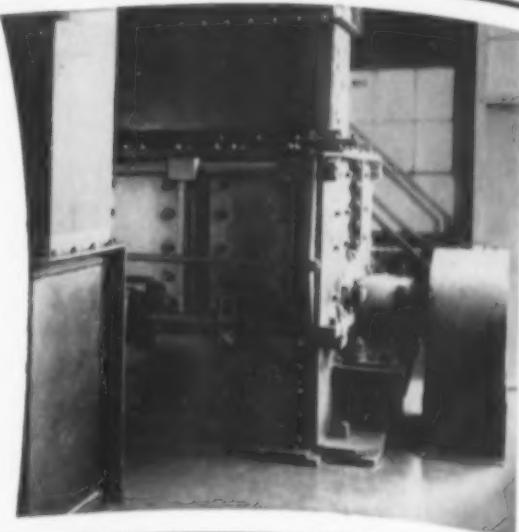
**S**INGLE AND DOUBLE roll crushers, FLEXTOOTH® and FLEXROLL® crushers, swing hammer pulverizers—Jeffrey makes all the popular types used in power plants, large or small.

Care in selecting the proper type of crusher means the difference between an efficient installation and one that bottlenecks coal moving through the plant.

Our engineers will gladly give you complete satisfaction on your problem, using their years of experience with every conceivable crushing case.

Jeffrey also offers the most complete test history file of any manufacturer of crushing equipment, plus a fully equipped laboratory where tests on coal in doubtful cases will be run at no expense or obligation to you.

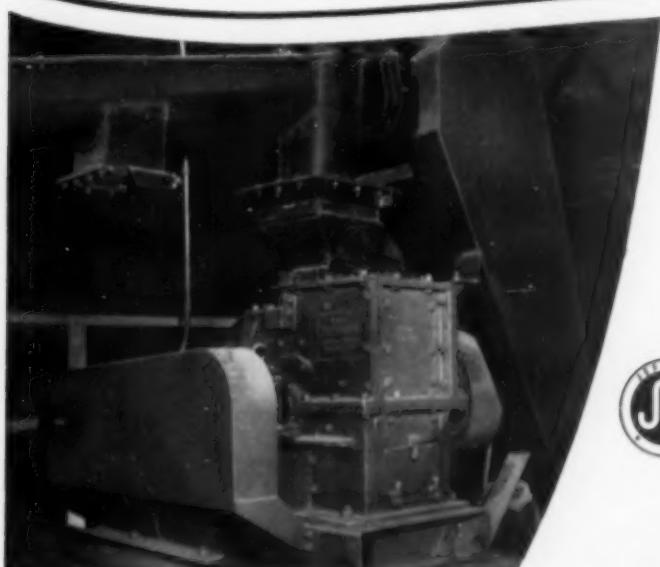
For more information, write for Catalog 784-C. The Jeffrey Manufacturing Company, Columbus 16, Ohio.



Top: 42" x 66" FLEXTOOTH for coal reduction to minus 1" or  $\frac{1}{4}$ ".

Center: 42" x 82" Type B Reversible Swing Hammer for crushing coal down to minus  $\frac{1}{8}$ ".

Bottom: 20" x 12" Type A-2 Swing Hammer Pulverizer for medium and small capacity plants, also in sampling operations. Reduction down to minus  $\frac{1}{2}$ " to 10 mesh.



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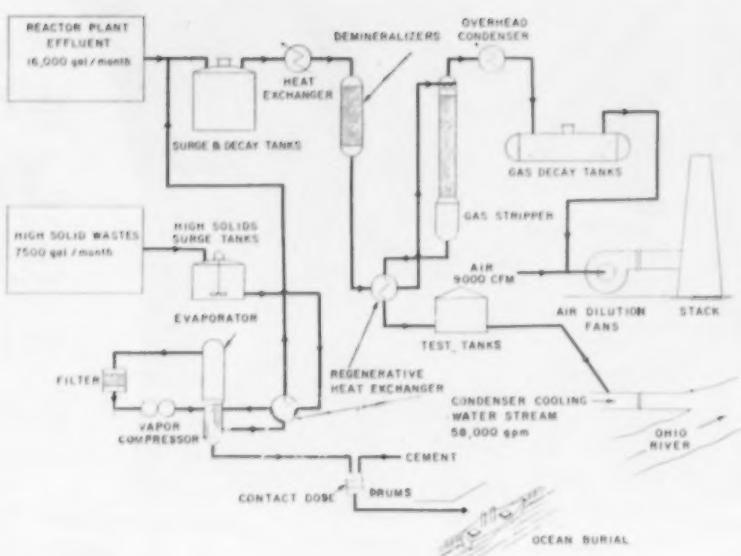
reactor plant proper is of all welded construction.

These two methods of containment then are the normal means of confining the radioactivity within the reactor plant. However, maintenance of equipment, normal shutdown, safety valve discharges, etc., require that coolant be drained from the plant. It is this drained effluent that constitutes the majority of the wastes to be handled and disposed of in the radioactive waste disposal system.

### Waste Disposal

The problems associated with the disposal of radioactive wastes at an atomic power plant situated in a populated area are much the same as those encountered in the disposal of chemical or sanitary wastes. As is the case for chemical or sanitary wastes, maximum permissible concentrations for radioactive pollutants have been established. A major aspect of the design is to insure that these tolerance values are not exceeded.

To accomplish this goal, the radioactive waste disposal facilities have been designed to meet even more stringent, self-imposed engineering limits on the activity levels leaving the Shippingport site. The following major criteria have been established for the basis of design at Shippingport.



Flow Sheet No. 1  
Radioactive waste disposal

a. The radioactive waste must be reduced in concentration, when necessary, by a disposal system. The concentration of these wastes in water discharged to the river, and in air discharged to atmosphere shall not exceed 10 per cent of the maximum recommended in National Bureau of Standards Handbook 61, entitled "Regulations of Radiation Exposure by Legislative Means."

b. In addition, any released material must conform to the requirements given for disposal of radioactive wastes in Codes of the State of Pennsylvania.

c. Any tank or burial facilities must be protected against leakage into the ground and vapor release into the atmosphere.

d. Sufficient capacity must be provided to store radioactive gases for the maximum duration of a weather inversion.

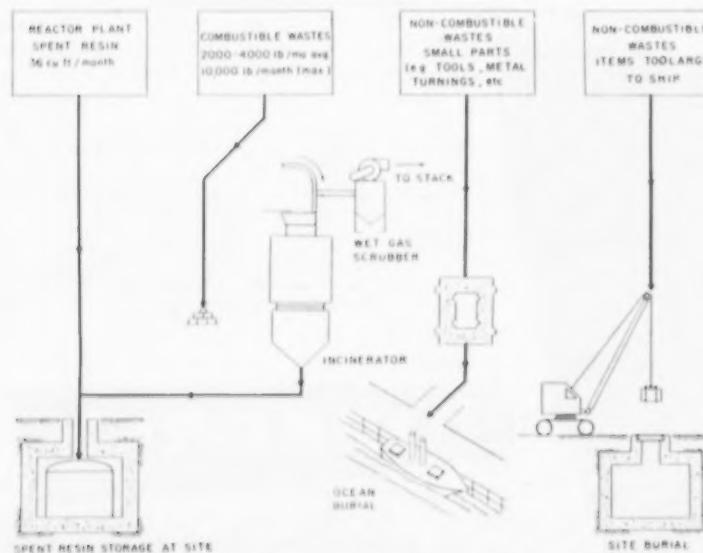
e. Any wastes which are shipped from the site must be packaged in a manner to prevent a radioactive hazard to personnel. Regulations as set forth in the U. S. Interstate Commerce Commission Regulations — Parts 71 to 78 for public carriers will be observed.

It should be pointed out that spent fuel elements will not be reprocessed at Shippingport. Thus, the problems associated with the disposal of radioactive wastes will be relatively minor compared to those at installations where chemical processing is done.

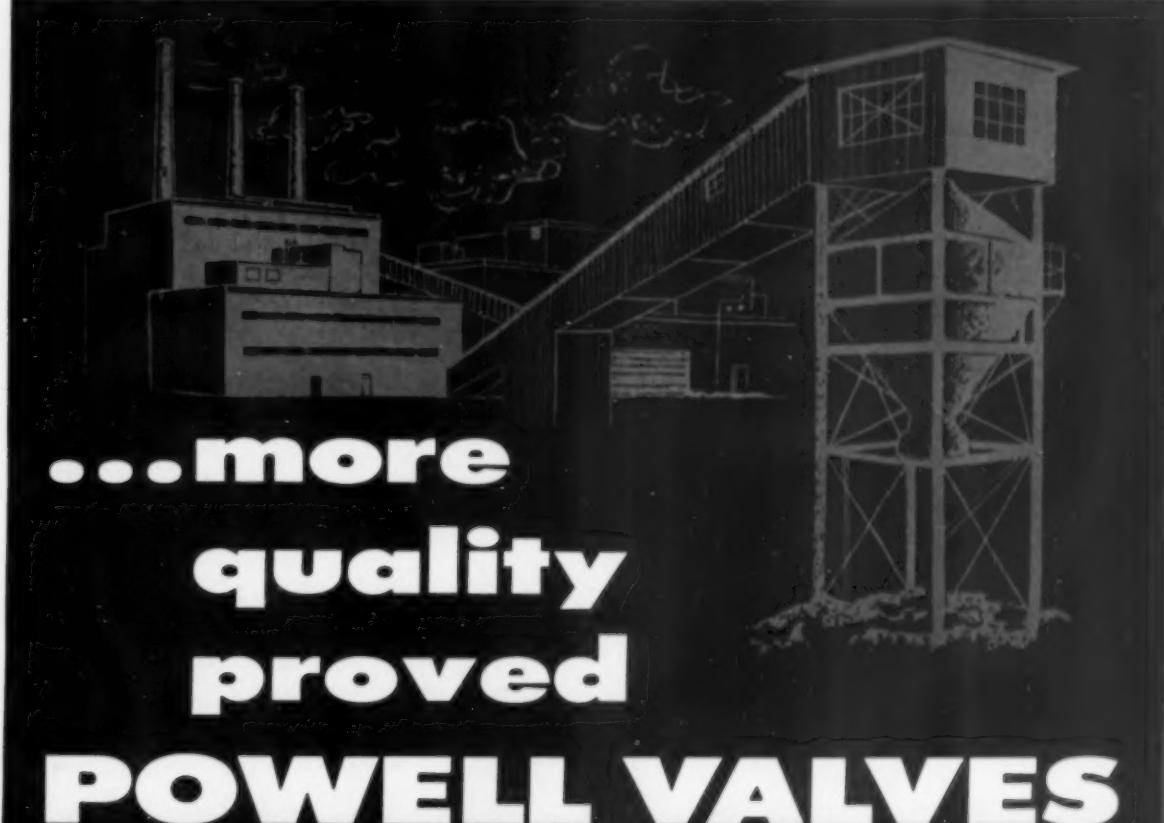
### Treatment of Wastes

While the problems are similar, wastes from Shippingport cannot be treated in the same manner as waste from other industries. One striking difference is that radioactivity can neither be neutralized nor destroyed by chemical means. Three general methods of controlling radioactive wastes have been adopted: a. Natural decay, b. Concentration and storage, c. Dilution.

To illustrate how these methods are applied to the process, a brief (Continued on Page 86)



Flow Sheet No. 2 — Radioactive waste disposal



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**POWELL VALVES**

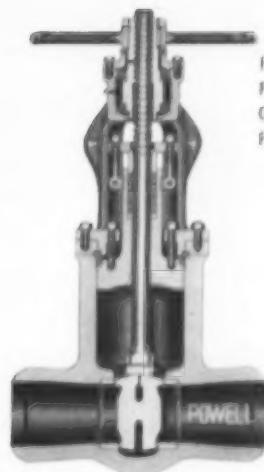
FIG. 9003 W.E.—  
900-Pound Steel Gate  
Valve, Bolted Flanged  
Yoke, Outside Screw,  
Rising Stem.



FIG. 375—Bronze Gate Valve  
for 200 Pounds W.S.P. Inside  
Screw Rising Stem.



FIG. 11303 (Sec.)—  
Pressure Seal Steel  
Gate Valve, 1500  
Pounds. Welded Ends.



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Consult your Powell Valve distributor for all the facts about quality proved bronze, iron, steel and corrosion-resistant valves. For every flow problem . . . there is a Powell Valve to solve it.

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## Atomic Waste Disposal (Continued)

description of the system is given. All of the liquid, solid, and gaseous wastes which might contain any radioactive material are transported to a waste processing area. Here the radioactive wastes are segregated, processed or stored, and ultimately disposed of.

As shown in Flow Sheet No. 1, liquid effluent is delivered to underground stainless steel tanks where it is monitored for radioactivity. Dependent upon the results of the monitoring, the waste liquid may be stored in these tanks for a desired period while the radioactivity decays or is processed through demineralizers and a

gas stripper. Or, if within permissible limits, the liquid can be blended with the condenser cooling stream for discharge to the river.

Soluble radioactive impurities as well as particulate matter are removed in a series of mixed bed demineralizers. Dissolved fission gases, if present in these wastes are then removed in a steam stripper operating under a slight vacuum and are allowed to decay by storing in steel tanks for a sufficient period of time to permit safe discharge to the environment. The processed liquid is then held up in test tanks for sampling in or-

der to assure that the liquid discharged from the plant when diluted with the condenser cooling water stream will meet allowable tolerances.

Liquid and gaseous effluents will be monitored in the control area both before and after discharge to the environment and at a sufficient number of sampling stations outside the plant area to assure safe practices. It is estimated that the average volume of the liquid wastes will not exceed 16,000 gallons per month.

Liquid wastes, containing a high concentration of impurities, such as fluids used for decontaminating equipment, facilities, etc., are processed through a vapor compressor evaporator. The distillate from the evaporator will be sent to the liquid surge tanks and the concentrate will be mixed with cement and drummed for burial at sea. It is estimated that the wastes will accumulate at a rate of 7500 gallons/month.

Solid wastes are handled as shown in Flow Sheet No. 2. Spent demineralizer resin, principally from the internal purification system, is diverted to permanent underground stainless steel storage tanks surrounded by a waterproof concrete enclosure in which the solids settle out and the water used to transport the resin is decanted to the liquid decay tanks for possible further processing. It is estimated that this waste will accumulate at a monthly rate of 36 cu ft.

Combustible contaminated solid wastes such as paper, rags and clothing will be burned in an incinerator. Gases from the combustion process will be scrubbed and filtered to remove air-borne particulate matter. Ashes and wash water will then be slurried to the resin storage tank. It is estimated that the quantity of combustible wastes will vary from 2000-4000 lb/month on the average and 10,000 lb/month as a maximum.

Solid wastes such as tools, metal turnings, small items of equipment will be placed in 30 gallon drums and sealed. The 30 gallon drum is then placed in a larger



## Inexpensive All-Weather Shelter

**TO PROTECT** machinery being assembled in the open from corrosive sea air at its new ultra-modern refinery, Tidewater Oil Company in Delaware constructed an inexpensive type of all-weather shelter with film made of Bakelite polyethylene. Tacked to knock-down wood frames, the tough film withstands rain, snow and winter winds and is inert to most chemicals.

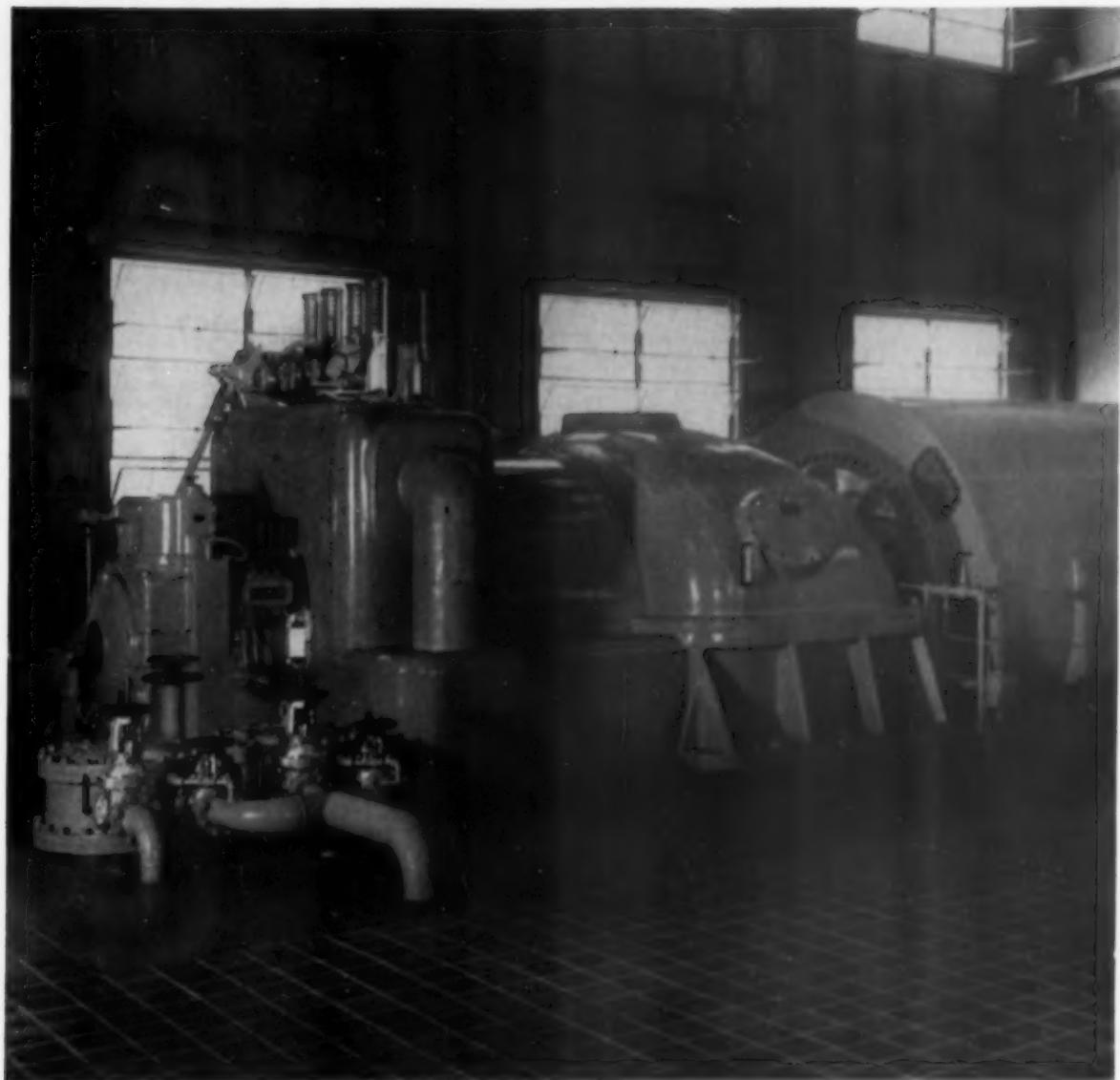
Because the film is translucent, construction workers can assemble machinery in natural light. A large centrifugal blower may take several days to assemble, and, during this time, interior parts must be protected from moisture. Nine such blowers were installed at the refinery.

The flexible film, supplied by

Visking Company, Terre Haute, Ind., was tacked to the light wooden framework from rolls 20 ft wide and about 200 ft long. Inside the temporary structure, air is kept warm and dry with infra-red lamps. This not only makes it more comfortable for the workers assembling the machine, but also helps to prevent condensation of moisture which could cause corrosion of machine parts.

Tidewater's Delaware Flying A Refinery, 15 miles south of Wilmington near the Delaware River, has the largest initial capacity of any refinery ever built. Plant has one of the first boiler installations specifically designed to use fluid coke as a primary fuel.—See "Burning Fluid Coke" in SPI for March, page 70.

(Continued on Page 108)



### Specific Lubricants for Specific Problems

For want of the *exactly right* lubricant, a machine in your plant may not be functioning as productively as it should. Because the combined facilities for research behind Standard Oil lubricants are the largest in the world, they are always abreast of industry's needs.

The fact that after 70 years of service to

Southern industry, Standard Oil lubricants continue first in popularity, is proof they continue to deliver satisfaction down through the years. Your Standard Oil representative will analyze your lubrication problems and submit recommendations without cost or obligation.

**STANDARD OIL COMPANY (Kentucky)**



**The Booming South and Southwest . . .**

## New Plants — Expansions

- ✓ Manufacturing Plants
- ✓ Utility Plants
- ✓ Large Service Plants

### Highlights for June, 1957

These highlights briefed from SPI's SOUTHERN INDUSTRIAL NEWS SERVICE, a monthly publication issued exclusively to SPI advertisers and their representatives through the South and Southwest.

#### South Atlantic

Plans underway for additions to **Mainland Water Treatment Plant** in **Daytona Beach, Fla.** at a cost of \$565,400 . . . \$500,000 diesel engine plant planned for Florida East Coast by **American Machine & Research Corp.** . . . **Florida Power & Light Co.** planning \$50,000,-000 nuclear power plant capable of producing 150,000 kw of electric power daily . . . \$132,600,000 natural gas enterprise underway in **St. Petersburg, Fla.** for **Houston Texas Gas & Oil Co.**

\$25,000,000 transformer plant underway in **Athens, Ga.** for **Westinghouse Corp.** . . . Within 2 years 200 persons to be employed at electronics and communications research facility in **Atlanta, Ga.** which is being constructed by **Federal Telecommunications Laboratories, Inc.** . . . \$100,000 transportation equipment facility planned by **Posey-Lynn Co.** in **Atlanta, Ga.** . . . 100,000 sq ft clothes-pressing machinery plant costing \$1,000,000 to be erected in **Atlanta, Ga.** by **Unipress Corp.** . . . Early 1958 completion scheduled for \$3,000,000 food plant for **Gordon Foods** in **Atlanta, Ga.** . . . In **Savannah, Ga.** multi-million dollar expansion and modernization program planned by **Union Bag-Camp Paper Corp.** . . . \$2,300,000 expansion program underway in **Savannah, Ga.** for **South Atlantic Gas Co.** . . . Fall completion scheduled for \$300,000 laboratory in **Savannah, Ga.** for **Herty Foundation.**

Multi-million dollar hyper-pure silicon plant underway in **Brevard, N. C.** for **Du Pont Co.** . . . **Blue Bell, Inc.** planning \$500,000 office structure in **Greensboro, N. C.** — part of \$3,000,000 expansion program . . . Nuclear-fired electric generating station proposed for the state within next five years — to cost between \$10,000,000 and \$20,000,000.

\$2,000,000 expansion program scheduled for **Eureka Plant of Springs Cotton Mills Co.** in **Chester, S. C.** . . . **Bowaters Carolina Corp.** constructing 400 ton sulphate pulp mill costing \$38,000,000 in **Catawba, S. C.** . . . \$9,000,000 **North Saluda River Reservoir** well underway in **Greenville, S. C.** with dam construction to begin in the summer.

Spring of 1958 will see the beginning of **Appalachian Electric Power Co.**'s Smith Mountain Dam in **Gretna, Va.**

— to cost \$20,000,000 . . . Construction underway in **Lynchburg, Va.** on the \$2,700,000 neutral sulphite recovery plant at the **Herald Div. of The Mead Corp.** . . . \$70,000,000 construction program planned by **Virginia Electric & Power Co.** . . . **Appalachian Electric Power Co.** to spend \$56,000,000 on construction projects . . . Plans underway in **Roanoke, Va.** for \$58,000,000, 450,000 kw generating unit at the **Philip Sporn Plant**, jointly owned by **Appalachian Electric Power Co.** and **Ohio Power Co.**

\$2,000,000 expansion planned by **Goodrich-Gulf Chemicals, Inc.** in **Institute, W. Va.** which will double production . . . \$30,000,000 radio astronomy center underway in **Marlinton, W. Va.** . . . **Wheeling Steel Corp.** planning \$35,000,000 expansion in **Wheeling, W. Va.**

#### East South Central

**Natco Corp.** planning \$2,100,000 clay conduit pipe plant in **Bessemer, Ala.** . . . July 1 will see the beginning of the \$150,000,000 steam generating plant for **Southern Generating Co.** in **Birmingham, Ala.** . . . Multi-million dollar **Container Corp.** food container plant underway in **Brewton, Ala.** . . . July 1 production anticipated for **Gulf States Paper Corp.**'s bleached pulp mill in **Demopolis, Ala.** — 275 tons daily capacity.

**Embry Container Corp.** to spend \$575,000 on new equipment and construction in **Louisville, Ky.**

\$5,000,000 chemical manufacturing plant planned on 586 acre site in **Aberdeen, Miss.** for **American Potash & Chemical Corp.**

**Magnavox Co.** planning \$1,000,000 expansion program in **Jefferson City, Tenn.** . . . \$1,250,000 plant being planned by **General Electric Co.** in **Murfreesboro, Tenn.** . . . **New Johnsonville, Tenn.** will be the home of the titanium plant for **E. I. du Pont de Nemours, Inc.** — costing \$10,000,000 to \$15,000,000.

#### West South Central

**Jonesboro, Ark. Water & Light Co.** planning \$400,000 improvements on its sewage system . . . **Teletype Corp.** planning \$608,000 plant containing 75,000 sq ft

**Teamed  
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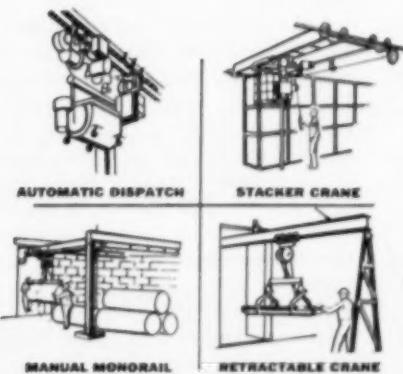
U. S. Rubber Company and American MonoRail Engineers teamed up to develop this system. The Sealdbin containers, a product of U. S. Rubber Co., each hold 11,000 pounds of costly carbon black. This American MonoRail System moves the Sealdbins from flat cars or trucks to special stations for discharge. Empty deflated containers are returned to the supplier for re-use.

Working together this expert team has minimized manual labor, time, and waste.

If you have a materials handling problem, call your nearby MonoRail Engineer or write us.

Send for Bulletin C-1.

Member of Materials Handling Institute and MonoRail Mfrs. Assn.  
For Power Driven Conveyors, Use Landolt Chainless Conveyors



AMERICAN



**MONORAIL** COMPANY

13105 ATHENS AVENUE • CLEVELAND 7, OHIO  
(IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)



## New Southern Plants and Expansions (Continued)

### Highlights for June, 1957

in Little Rock, Ark., as well as another building containing 400,000 sq ft.

\$500,000 regional office being erected for Petroleum Chemicals, Inc. in Lake Charles, La. — part of \$60,000,000 expansion program . . . Underway is \$17,000,000 terminal building for Moisant International Airport in New Orleans, La.

210 acre site in Oklahoma City, Okla. purchased by Western Electric Co. for construction of an electronics manufacturing plant containing 1,200,000 sq ft of floor space.

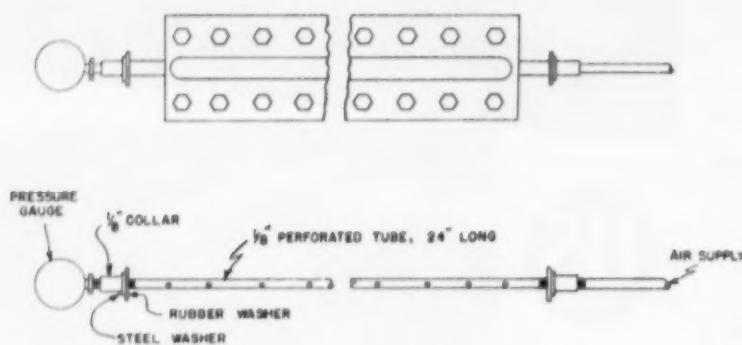
\$10,000,000 plant to be constructed for Diamond Alkali Co. in Deer Park, Tex. — part of new unit to produce acetylene from natural gas . . . El Paso Natural Gas

Products Co. laying plans for crude oil refinery and alkylation plant in Odessa, Tex. . . \$1,000,000 expansion planned for Longhorn Ordnance Plant in Marshall, Tex. for providing guided missiles . . . Visco Products Co. Inc. to construct plant in Sugarland, Tex. for producing oil industry chemicals.

### Kansas & Missouri

Kansas City, Kans. constructing \$1,400,000 sewage disposal plant and collecting system.

\$200,000, 31,000 sq ft addition underway in Joplin, Mo. for Pacific Mercury Television Mfg. Corp. . . . Chemagro Corp. erecting \$2,000,000 research laboratory and office building in Kansas City, Mo. . . . 30 acres of land in St. Louis, Mo. has been purchased by Crown Zellerbach Corp. for construction of flexible packaging materials plant . . . \$1,600,000 electric power generating plant being planned for Sikeston, Mo.



### Assembling High Pressure Boiler Gauge Glasses

IN THIS improved method of assembling gauge glasses for high pressure boilers, the pressure applied to the gauge glass interior forces the mica into the proper position for tightening. This assures proper installation of gauge glasses which reduces the number of replacements required.

The gauge glass and gaskets are assembled in the usual manner. Before tightening the bolts, a length of  $\frac{1}{8}$ " perforated pipe is placed inside the gauge glass with packing at each end tight enough to assure an air-tight connection. A pressure gauge is installed on

one end of the perforated pipe and an air supply line is attached to the other end. The gauge assembly bolts are tightened slightly after applying 5 psi. Then 15 psi is applied and the bolts are tightened securely.

This entire procedure is applicable only where gauge glass repairs are made in the plant maintenance shop. Replacement of high pressure gauge glasses in the field is not recommended.

By C. J. DYCUS, Gas Plant Instrument Maintenance Man, Katy Gas Cycling Plant, Humble Oil & Refining Co., Katy, Texas.

### Carbon Deposits

CARBON DEPOSITS and sticking valves—a maintenance nuisance—were tying up a heavy duty air compressor. The company—a leading aircraft manufacturer—needed power. Ninety per cent of its vital tools were pneumatic. After exhausting the field of conventional lubricants, the company turned to lubricants that were specially compounded for problem applications.

The lubricant chosen for a six-month trial was Keystone No. 49 Light. This oil, specially compounded for high temperature applications, resists sludging, oxidation and breakdown when subjected to severe temperatures.

After six months service, without downtime, the compressor was given a semi-annual overhaul. The results were: (1) Cleaner valves—no carbon had built up during this period. (2) Less maintenance time—cleaning time was cut from 30 to 20 hours. All maintenance men had to do was wipe the valves clean with a rag. (3) Less oil used—during this six-month period, the compressor oil feed was reduced from six to three drops per minute.



Cutaway of Garlock Rubber Expansion Joint shows steel reinforcing rings which vary in number with size of joint.

## CORRECT VIBRATION, NOISE and FLANGE BREAKAGE...

**GARLOCK RUBBER EXPANSION JOINTS** are made from high-grade rubber, combined with plies of sturdy cotton duck and reinforced with steel rings. Practically any size or type expansion joint is available for service handling any liquid or gas. For example:

### TYPE

Rubber Expansion Joints  
(Spool-type, U-type,  
Tapered, Offset)

Neoprene Expansion Joints

Teflon\*-lined Rubber Expansion  
Joints  
All-Teflon Bellows-type  
Expansion Joints

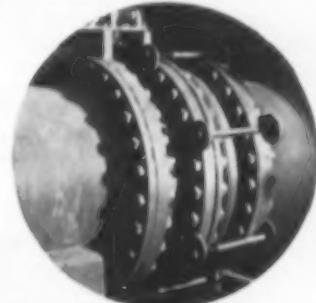
### USE

Hot or cold water  
Mild acids or caustics  
Brine, air, exhaust steam

Oil  
Other Petroleum Derivatives  
Strong acids and caustics  
Halogenated Solvents  
Pure Foods



Garlock Expansion Joint on 2½" suction and discharge pipes of oil pumps.



Garlock Expansion Joint on 30" pipe line connecting propeller-type circulating water pumps.

Rubber Expansion Joints are another important part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The *only* complete line. That's why you get *unbiased* recommendations from your Garlock representative. Call him or write for Rubber Expansion Joint Folder AD-137.

**THE GARLOCK PACKING COMPANY, Palmyra, New York**

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

# GARLOCK

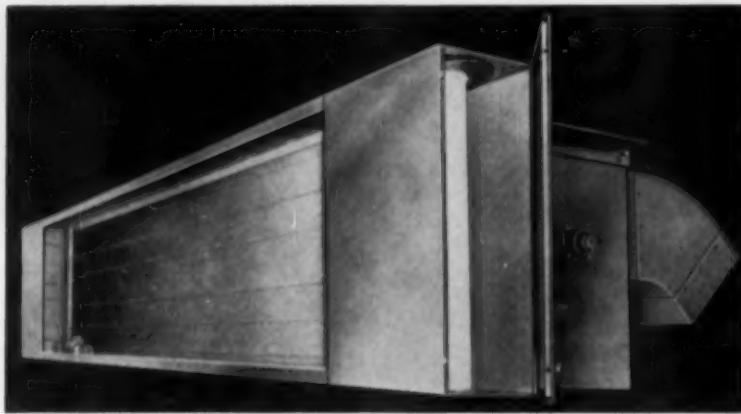


\*DuPont Trademark

Packings, Gaskets, Oil Seals, Mechanical Seals,  
Rubber Expansion Joints, Fluorocarbon Products

# Equipment . . . Supplies . . . Methods

FOR FREE INFORMATION — Circle Code Number on Page 103 Return Card



## Automatic Air Filtration in Air Handling Units

**F-1** Automatic air filtration and "once a year maintenance" for air handling units has been introduced in the new Roll-O-Vent line of industrial unit heaters, heating and ventilating units, and air conditioners for **American Air Filter Co., Inc.**, 215 Central Ave., Louisville 8, Ky.

Automatic filtration is accomplished by use of a continuous glass fiber curtain that moves horizontally through the entering air stream of the unit just ahead of the coils and fan sections. Fresh media is automatically supplied to the air stream by an automatic timer to provide constant filter efficiency and automatic disposal of contaminated media.

Frequent maintenance and replacement of filter media is virtually eliminated by the Roll-O-Vent. Under normal operating conditions, the media would need replacing only

once a year. The media is easily disposed of by merely removing the spool of dirty media and replacing it with a new spool of clean media.

Since clean media is periodically introduced, filter resistance remains constant. The density of the media is graduated by both increasing the number and decreasing the diameter of the fibers from the front to the rear of the mat. This provides progressively more efficient air cleaning and apportions the dust load through the depth of the mat for greater dust holding capacity.

The Roll-O-Vent filtering media is composed of continuous, slightly curled, interlaced glass filaments. These are held in place at every point of contact with a thermosetting plastic bond to form a thick resilient pad or "blanket."

These fluffy blankets are impregnated with a special non-flammable, jell-like viscoine that is designed to operate at temperatures up to 150 F.

## Conveyor Belt Splices

**F-2** It is now possible to cover or protect conveyor belt splices made with Flexco Fasteners by using Rema, the new self-vulcanizing rubber repair material, distributed by **Flexible Steel Lacing Co.**, 4607 Lexington St., Chicago 44, Ill.



Two methods are generally used. In one method the Flexco Fasteners are recessed in the belt and then covered with Rema surface strips. This provides a smooth belt surface which is especially desirable when plows or scrapers are used. Both top and bottom of belts can be protected in this manner.

Rema seals out moisture, reduces mildew, rot and deterioration. Sifting and seepage of fines is prevented. Belt operation is quieter.

In the second method both ends of the belt are sealed with Rema Red Filler Sheeting before applying Flexco Fasteners. This is a simple and effective way of minimizing deterioration of belt ends.

Belts can be put into operation as soon as joint is made and Rema is applied. No heat or heavy vulcanizing equipment is required. Regular maintenance men can quickly do the job.

## Centrifugal Dust Separator

**F-3** A low cost, high efficiency centrifugal dust separator known as the DAY "HV" has been announced by **The Day Sales Company**, 810 Third Ave., N.E., Minneapolis 13, Minnesota.

Designed for maximum efficiency, the path of the dust laden air traveling through the "HV" encounters a minimum of turbulence due to the scroll inlet and airfoil design inlet vane. A steep, smooth cone assures uniform and quick delivery of the dust to the dust outlet. All these factors result in an improved cyclonic dust collector with low resistance requiring less fan power.

The centrifugal separator has a wide range of applications. The design permits handling of fibrous, granular, abrasive, fine or coarse dusts at normal or high temperatures. It can be used on pressure or vacuum.

Twenty standard sizes are available. Groupings of any sizes can be furnished to handle any volume of air from 150 cfm upwards. Bulletin 576 gives details.



**TEXAS NATIONAL BANK BUILDING**—Serves as headquarters for the bank and Continental Oil Company, contains 21 floors of office space, has shopping areas on first floor. Sprinkler system serves basement, sub-basement and first floor; uses 5,242 ft. of SPANG Pipe feeding 801 sprinkler heads.

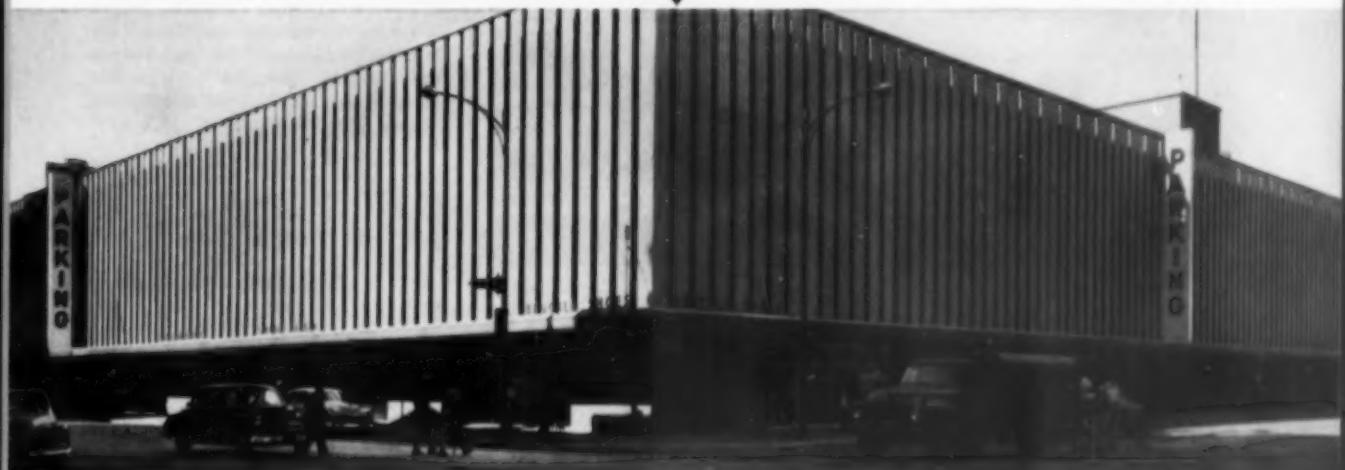


**MEDICAL ARTS PARKING GARAGE**—This 9-story, 320 car facility has horizontal-vertical elevators which deliver cars automatically in 75 seconds. Sprinkler system protects basement, contains 1,677 ft. of 1" to 5" SPANG Steel Pipe serving 171 sprinkler heads.

**TEN-TEN PARKING GARAGE**—The south's largest public parking facility has 1,500-car capacity, is of ramp-type construction with heliport on the roof. Sprinkler system for sub-basement, basement and first floor shops contains 18,911 ft. of SPANG Steel Pipe feeding 1,507 sprinkler heads.



**BANK OF THE SOUTHWEST BUILDING**—Houston's newest and largest office building is 24 stories high, contains the largest single banking room in the nation. Sprinkler system for basement, sub-basement and first floor uses 17,000 ft. of SPANG Pipe, has 1,111 sprinkler heads.



## FIRE PROTECTION WITH **SPANG® STEEL PIPE**

Down Texas way, sprinkler systems must pass the rigid requirements of the Texas Fire Commission. Commission inspectors test the system at 200-pound hydrostatic pressure for two hours. Each system must provide 15 psi residual pressure for 25 gpm water delivery at the top line sprinkler.

Naturally, the SPANG Steel Pipe sprinkler systems, installed in these four new Houston buildings, passed these tests and more than met the National Board of Fire Underwriter requirements . . . because SPANG Pipe is manufactured under strict quality-

control conditions, is inspected and tested before shipping to assure a *top-quality* product.

In every type installation, SPANG Steel Pipe will give you *top-quality* performance. Try it and see for yourself. For *top-quality* service, contact your local SPANG Distributor.

**SPANG®**  
CW STEEL PIPE

**SPANG-CHALFANT**  
DIVISION OF THE NATIONAL SUPPLY COMPANY  
General Sales Offices: Two Gateway Center, Pittsburgh, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

### **Equipment, Supplies & Methods (Continued)**



## Concrete Drilling Machine

**F-4** Powder Tool Fasteners, 5349 West Madison St., Chicago, Ill., has introduced a high speed portable diamond drilling machine for drilling holes in concrete, brick, granite, or any hard masonry material. Equipped with a Molco water swivel this machine will drill 2" diameter holes at up to three inches per minute. Holes as small as  $3/16"$  can be drilled with ease in the hardest of building materials.

The flexible cable drive allows freedom for drilling holes in any position and eliminates the necessity of the operator holding a heavy unit. The machine can be powered by plugging into any 110 volt circuit.

## Valve Stem Packings

**F-5** The Garlock Packing Company, 403 Main St., Palmyra, New York, has announced two new styles of asbestos braid jacketed plastic core valve stem packings for high pressure and/or high temperature service. Designated Styles 5855 and 127, the new packings both utilize inconel wire in the packing jacket.

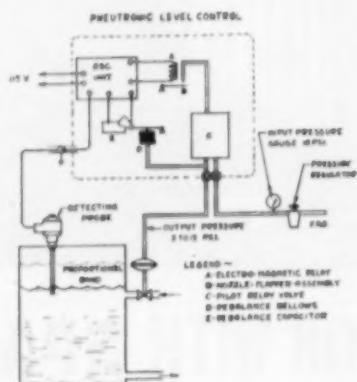
Style 5855 is for general service

stem valve packing where conditions are not extreme, i.e., top stuffing box temperature range of 500 to 600 F, and pressures of several thousand psi can well be handled providing the valve is designed to stay within the temperature limitations. Style 5855 has a jacket composed of commercial asbestos yarn reinforced with inconel wire and with a corrosion inhibitor.

Style 127 is for use in packing any fluid which will not affect the asbestos. It is ideally suited to extreme heat conditions, such as box temperatures of 750 F and pressures to several thousand psi. It will withstand considerable super heat, and is an excellent high temperature oil refinery packing. Style 127 has a jacket composed of 90% asbestos yarn reinforced with inconel wire and with a corrosion inhibitor.

## Explosion-Proof Level Control System

**F-6** The combination pneumatic-electronic level controller recently developed by **Fielden Instrument Division, Robertshaw-Fulton Controls Company**, 2920 North 4th St., Philadelphia 4, Pa. now is available in a new explosion-proof model.



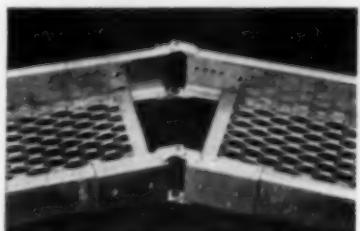
The "Pneutronic" controller is intended for use in Class I, Group C and D and Class II, Group E, F and G hazardous locations. It is capacitance-actuated and will convert the smallest change in level into a proportional air output. It is being used to control the level of liquids (including water, acids, alkalis, oils and aqueous solutions).

Systems are available with either

of two types of pneumatic action: Model 111 produces an increase in air output with an increase in measured level. Model 112 produces a decrease in air output with an increase in measured level.

## Adjustable Elbow for Cable Support Systems

**F-7** **P-W Industries, Inc.**, Duncan & Melrose Sts., Philadelphia, Pa., has added a new fitting to their cable support systems — expanded ladder or solid.



With the new elbow, adjustment can be made in either direction up to 90°. This provides greatest flexibility in getting around pipes, columns, structural members, etc. It is also applicable for jobs requiring constant changes in direction such as in tunnels, tanks, spherical shapes, etc.

#### **Oil-Tight Push Buttons**

**F-8** Roto-Push and Pres-Test are two of the newly development push button units of **Cutler-Hammer, Inc.** 315 N. 12th St. Milwaukee 1, Wisconsin.

The Roto-Push operator unit combines functions of a single button station with advantages of a two or three position selector switch in one unit. Contacts are maintained or momentarily operated by either turning the guard ring, depressing the button, or a combination of both.

The Pres-Test indicating light provides simple means of checking indicating lights without disturbing control circuit and without removing a lens or bulb.

Publication EL-178 describes company's complete oil-tight control unit line, offering back-of-panel depth of only 1 23/32" for the transformer types and 1 7/8" for resistor units. Available in key-operated, selector switch, flush button, mushroom head or knob-operated models.

### Heavy Fuel Heating System Assures Free Flow

Use of a tank heater to keep the oil in the storage tank warm, while necessary, is not always enough to prevent No. 6 fuel oil from freezing during a prolonged burner shutdown. To eliminate freezing in the pipes and clogging and gumming of the burner nozzle, **York-Shipley, Inc.**, York, Pa., has designed a heating-circulating system especially for No. 6 oil. It does three things:

1. Keeps the oil in continuous circulation. The pump works even when burner flame has been shut off or modulated to low firing. Oil not wanted at the burner is diverted automatically to a special chamber and returned to the heated storage tank to be warmed for recirculation.

2. Compensates for variable viscosity. Regardless of the viscosity or temperature of the oil being supplied, the viscosity compensator will provide either a constant or a modulated flow of oil to the atomizing cup. The compensator houses an electric preheater to provide a final control of the oil temperature.

3. Heats burner nozzle. A low-voltage current is supplied to an induction coil wrapped around the burner nozzle. This keeps the oil within the nozzle from freezing after the burner has shut down in response to a drop in steam demand.

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### Bonnet Steel Valves

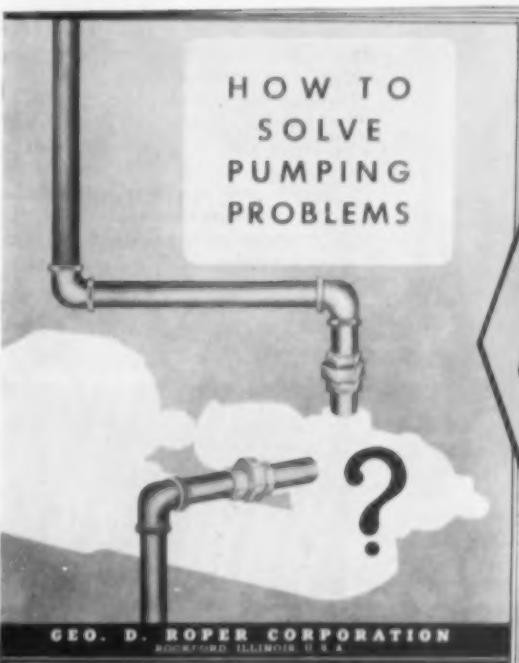
Bolted bonnet steel valves —in globe, angle, check, "Flocontrol" and high pressure drop designs—are available with either integral hard-faced or renewable stainless steel seats, depending upon type, from **Manning, Maxwell & Moore, Inc.**, Watertown, Mass. They feature OS & Y bonnet with Flexitallic gasketed joints and stainless steel swing bolts, nuts, thread bushings and packing gland followers.

The Type 5520 valves, with renewable seats, can be supplied with alternate trim, body and bonnet materials.

Designed as a companion to the manufacturer's Type 950 800# Steel Gate Valves, these new 600# bolted bonnet valves are designed to service public utility, petroleum, chemical and other industries. Sizes are from  $\frac{1}{4}$ " thru 2".

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## Equipment, Supplies & Methods (Continued)



### Heavy Duty Trolley

**F-11** **Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Michigan, recently introduced two new lines of I-beam trolleys with capacities from three thru ten tons. Called the 'Budgit' 'Hi-Cap' Trolleys, one line is a push type while the other is hand geared (illustrated).**

Both lines of trolleys eliminate all need for lubrication by featuring life lubricated bearings throughout. Under normal usage, repairs and maintenance will rarely or never be required. An unusual feature of the trolleys is the use of forged alloy steel wheels with crowned treads deeply case hardened by means of flame hardening. Flame hardening keeps tread wear at a minimum while tread crowning contributes to the extremely easy rolling characteristics of the trolleys. Crowning also allows the trolleys to operate equally well on all I-beam flange tapers from 0° thru 15°. (Standard flange taper is 9°.)

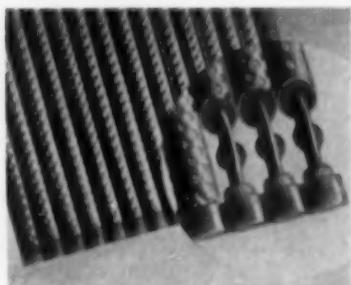
### Spray Gun Receiver

**F-12** Clogging due to paint hardening in the nozzle of spray guns between operating periods is prevented when the gun is placed in the Protectoseal Spray Gun Receiver, made by **The Protectoseal Co.**, 1920 So. Western Ave., Chicago 8, Ill. Paint spray

guns are always ready for instant use, regardless of the time lapse between operating periods; and the annoying, time-consuming necessity of daily gun cleaning is eliminated.

The new Protectoseal Paint Spray Gun Receiver keeps the nozzle tip of the spray gun in a solvent solution when not in actual use to prevent the paint from hardening to close the opening. Only the nozzle tip is in the solution and the packing is kept away from liquid and vapor so that it is not affected in any way.

Single gun receivers are located in the position most convenient to the operator without interfering with other operators. Multiple gun receivers are also available.



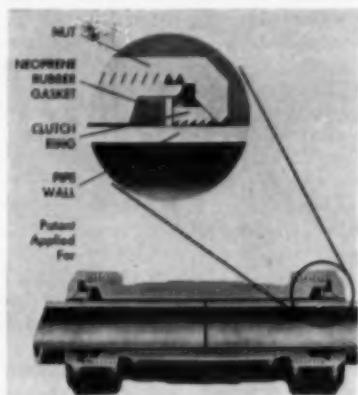
**Key to new battery design is this armored porous tubing. It is highly permeable to diffusion of electrolyte and passage of current. It acts like a cigarette filter, facilitating electrochemical action.**

### Batteries — More Power in Same or Less Space

**F-13** **The Exide Division of The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa., emphasizes that their new TG Exide-Ironclad battery has the highest ampere-hour per cubic-inch rating on the motive power market. It has a rated capacity of 72 ampere-hours per positive plate — contrasting with the 50 ampere-hour rating of the still widely used type TLM Exide-Ironclad.**

New development was accomplished thru the use of a completely new type of armored porous tubing to encase the grid spines and active material of the positive battery plates. It acts like a highly efficient cigarette filter, facilitating the electrochemical action.

This concentration of more power into the same battery-cube space gives materials handlers many immediate and long-range benefits. Users of electric trucks, whose present battery capacity is adequate, now can obtain the same capacity in less space for greater interchangeability in equipment and reduced costs. The new battery design removes a major barrier to further reduction of truck dimensions and correspondingly increased utilization of valuable aisle space.



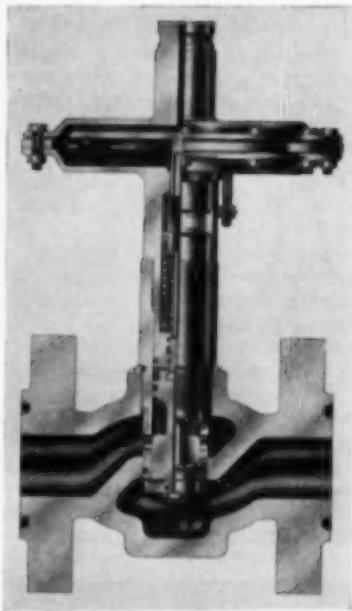
### Threadless Pipe Fittings

**F-14** Threadless pipe fittings that will withstand traction forces up to 3600 lb and hydro-static pressures ranging from 450 psi on 2" pipe to 5000 psi on  $\frac{1}{2}$ " pipe have been developed by **Telco Fittings Division, 5422 Redfield St., Dallas, Texas.**

Fittings are factory assembled, ready for use in joining steel, wrought iron, or plastic pipe. No threading, grooving, flaring, soldering or welding is necessary.

Superior gripping action is achieved through a specially designed brass clutch ring with internal serrations which grip the pipe wall. At the same time, a neoprene gasket is compressed against the pipe wall. Thus, a permanent seal against leakage of gas or liquid, and resistance to abnormal vibration, contraction or expansion is achieved. Socket ends and nuts are reamed slightly oversize to accommodate out-of-round and off-tolerance pipe ends.

Telco fittings are available in couplings, adapters, 90-degree elbows, and tees. Applications include prime plumbing work, plumbing repairs, cuts into existing lines, oil and gas piping, and machinery and equipment lines.



#### Diaphragm Control Valve

**F-15** Guaranteed to give bubble-tight closure against line pressures up to 10,000 psi, a new diaphragm control valve manufactured by **Garrett Oil Tools, Inc.**, Box 2427, Longview, Texas, features a completely pressure-balanced disk that is unaffected by line pressure either on opening or closing movement.

The pressure-balanced design permits the valve to be operated with supply air as low as 3 psi, with a single seat and one 8" diameter diaphragm. The entire inner valve, including the seat, is accessible from the top of the valve, and may be removed and replaced without breaking line connections. All working parts are fully enclosed to guard against damage from mechanical sources or atmospheric influences. The valve disk is guided throughout its movement, and is connected to the stem through a toggle-type arrangement that prevents any possibility of binding.

Designated as the Type "DCB-1," the valve is furnished in sizes from 2" through 4", with screwed or flanged connections as specified. It is available with a "controller top mount," as illustrated, or with a  $\frac{1}{4}$ " NPT top connection, and may be used with time-cycle controllers, pressure-actuated controllers or suitable types of electric pilots.

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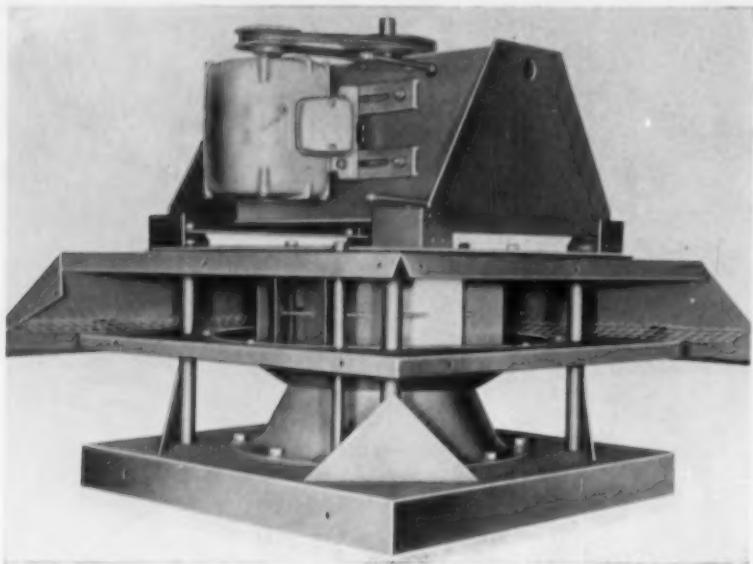


**Atlantic Steel Company**

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TRinity 5-3441

## Equipment, Supplies & Methods (Continued)



### Power Roof Ventilator

**F-16** An exclusive Jet Siphon feature distinguishes the new Clarage Centrilator, a centrifugal type power roof ventilator now being introduced by the **Clarge Fan Company**, Kalamazoo, Michigan. Photo shows unit with weather enclosure and two sides of air apron removed.

The Jet Siphon (patent applied for) and streamlined air flow are typical of the advanced aerodynamic design which produces a stable, highly efficient and quiet operating unit. In addition, the Centrilator is

designed and constructed to give unusually high static pressures (up to 2"). It thus is well suited for those applications where ductwork or hoods may impose considerable resistance, as well as for light-duty applications.

Four lifting lugs are on the Centrilator to facilitate handling and a pipe is provided for the wiring. Four bolts are all that are needed to secure the unit to the roof.

The Centrilator is built in 10 standard sizes with capacities to 26,400. Bulletin 550 describes these units and gives dimensions and capacities.



### Increment-Start Motors

**F-17** **Brook Motor Corp.**, 3553 West Peterson Ave., Chicago 45, Illinois, has announced that Brook 4-pole motors, 220 volt, 1800 rpm, from 20 hp and up, are now available for service requiring an increment-start motor, at the cost of a standard motor.

This is accomplished by use of standard two-step, 3-pole, general purpose starter, with a time delay of two to five seconds between the two steps. In addition special wiring in connecting the Brook Delta connected motor is required, which is comparatively simple. Wiring diagram is furnished.

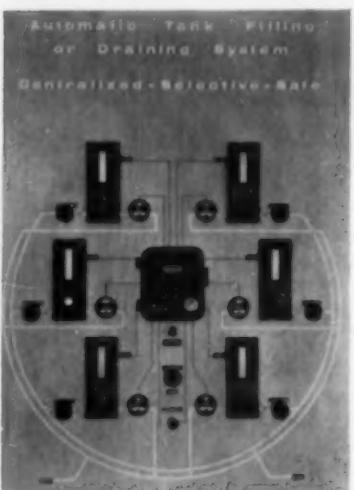
In starting the Brook a-c Increment Motor when the first set of contacts closes one-half of the motor winding is energized and the rotor begins to turn. After this first step with its time lag the second set of contacts closes and the breakdown torque is then identical to across the line starting. The second step parallels the remaining one-half of the winding in with the first half thereby completing the circuit and the

rotor quickly attains the full rated rpm.

Need for expensive, complex switchgear is eliminated. While these Brook Motors are standard, motors to be run on 440 volt or at speeds other than 1800 rpm can be built to order at a slight increase in price over standard motors.

### Selector System for Filling Storage Tanks

**F-18** A new automatic tank selector system has been developed by **Mason-Neilan**, 60 Nahatan St., Norwood, Mass. for controlling the filling of storage and settling tanks. It promises many new cost savings in petroleum, chemical and related industries.



The ATS System uses a pneumatic circuit, with a Selector-Controller and Level Transmitters directing operation of pneumatic fill valves.

In operation, the ATS Selector-Controller automatically senses the liquid level of each tank in the system through the Level Transmitter and then automatically opens the fill valve if tank requires filling, or automatically cycles to next tank if filling is not required. This is the scanning operation which can be continuous or intermittently cycled as needed, requiring only one second per tank. Each ATS Circuit can handle up to twelve tanks and two or more Selectors can be connected in series to control any number of tanks.

The complete operational sequence, plus diagrams and illustrations are now available in Bulletin No. 212.

### Lightweight Midget Lifters

**F-19** Designated the Type C Pull-A-Way, this easy-to-handle unit can be used for all raising, lowering and pulling jobs according to its manufacturer, Wright Hoist Division, American Chain & Cable Company, Inc., York, Pa.

Applications include: moving motors and other machinery, opening freight car doors, stretching and holding tension supports, removing and setting pipe in trenches, skidding loads, removing tree stumps, tightening guy wires, repairing belt or chain conveyors, holding cement forms and other "quick hook-up" jobs.

Engineering features—a double interlock prevents the brake from slipping; an automatic notch-per-cycle letdown assures positive control; and a safety handle prevents serious overloading.

The lifters are available in three capacities: 1½ ton, 3 ton and 6 ton. Standard lift of all units is 5 ft.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 103

### Pressure Transmitter

**F-20** A new, inexpensive indicating pressure transmitter, accurate to  $\pm \frac{1}{2}\%$  of scale range, has been announced by The Foxboro Company, Foxboro, Mass., for pneumatic transmission of process pressure measurements.

The Model 44 measures pressures of 0-30 inches of water to 0-6,000 psi, transmitting a 3-15 psi air signal to indicating, recording or controlling instruments.

To accommodate the various ranges, a choice of pressure elements is offered—spirals, helicals, bellows, and diaphragms; element materials are available for corrosive process fluids.

Eliminating the need for a separate field gauge, the transmitter has an eccentric indicating scale, 4½" long, built into the front of the case. Red pointer and black-on-white scale markings are visible from as far away as 20 feet to provide indication at point of measurement.

Universal mounting bracket provides choice of installation method: wall surface mounting or on vertical pipe. Output and 20 psi air supply connections are  $\frac{1}{4}$  NPSF; measurement connection,  $\frac{1}{4}$  or  $\frac{1}{2}$  NPT, depending on pressure range.

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## Equipment, Supplies & Methods (Continued)



### Direct Mounting Totally-Enclosed Motor

**F-21** A new totally-enclosed motor with facilities for mounting the driven equipment directly to the motor has been developed by **U. S. Electrical Motors**

Inc., Box 2058, Terminal Annex, Los Angeles 54, Calif. Accurate alignment is provided by means of a totally-enclosed, NEMA style "C" bracket with tapped holes for bolting from the driven equipment side. Designed to the new dimension standard of NEMA, the motor has more horsepower in less space. Designated Type J, the motor is available in ratings of 1 to 30 hp.

The direct connecting feature is also available in Type E certified safe, explosion-proof models in Class I, Group D for protection against highly inflammable gases and volatile liquids, and Class II, Groups F and G for operation in atmospheres pervaded with combustible dust.

### High Voltage Combination Motor Starters

**F-23** A new line of high voltage combination starters for squirrel-cage, wound rotor and synchronous motors, that provides increased overload and short circuit protection, has been announced by **Federal Pacific Electric Co.**, 888 N. Keyser Ave., Scranton, Pa.

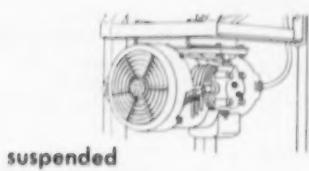
These new type FPA combination starters provide the advantages of current limiting high interrupting capacity fuses with rugged air break contactors.

These and other improvements meet the requirements of "the trend to greater circuit capacities in present day installations that complicate the problem of motor starter load control and maintenance. Federal Pacific Electric believes that the answer to the problem lies in greater load safety and easier assembly accessibility."

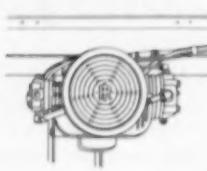
FPA combination starters are suitable for control and protection of all types of three phase, 50-60 cycle a-c motors operated at 2300-4800 volts with the following ratings: 900 hp, unity power factor, 2300 volts; 700 hp, 0.8 power factor, 2300 volts; 1500 hp, unity power factor, 4800 volts; and 1250 hp, 0.8 power factor, 4800 volts.

Interrupting ratings are: 150,000 kva at 2300 volts and 250,000 kva at 4160-4600 volts.

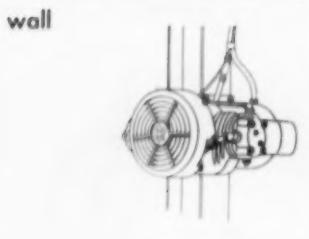
### versatility of mounting



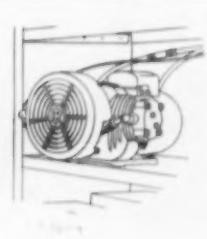
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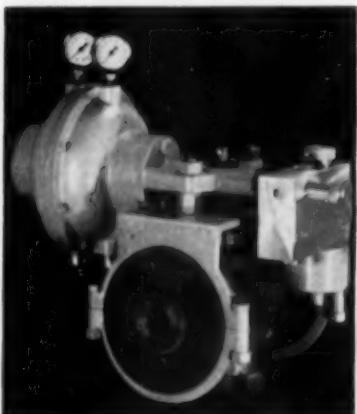
### Packaged Compressor Unit

**F-22** **Ingersoll - Rand Company**, 11 Broadway, N. Y. 4, New York, announces a new air compressor known as the "Channel-Flo." It is a two stage, 200 psig rated motorcompressor presently available in 1½ and 2 hp sizes. The complete packaged unit includes the motorcompressor, cushioned rubber mounting on an ASME vertical tank, interconnecting piping and fittings and automatic start-stop control.

The manufacturer claims important safety and space-saving features in this new unit. Troublesome and hazardous belt drive is eliminated because the compressor is flange-mounted directly on the driv-

ing motor. Due to this direct mounting, the Channel-Flo requires less than half the floor space of tank-mounted, belt-driven units of comparable size. It can also be mounted on a shelf, side wall or overhead bracket with the air receiver located in an out-of-the-way space.

The unit derives its name from the I-R Channel Valves used in both the low and high pressure cylinders. This is the same type valve the Company uses in its continuous operating process compressors up to 6000-horsepower. Introduction of this valve in the small compressor sizes means less valve maintenance and longer compressor life for these units. Form 1547 gives complete engineering details.

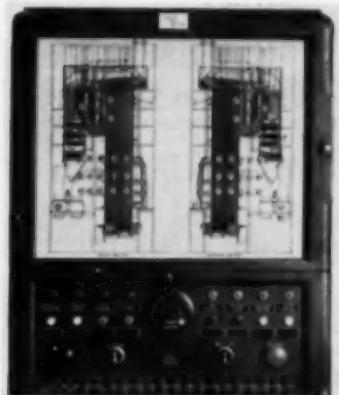


### Plug Valve Control

**F-24** **Bettis Corporation**, Box 9365, Houston 11, Texas has developed positioner attachment to its line of Robotarm Plug Valve Actuators.

The Positioner is a compact instrument designed for attachment to standard Robotarm Actuators.

Modulating operation can be obtained from instrument signals of 3 - 15 psi, 3 - 15 oz, or high pressure air or hydraulic ranges as required.



Front of Model SSC-120 contains cross-sectional views of boiler with indicating lights showing location of blower elements. Lower panel contains individual toggle switches and main control buttons and signal lights.

#### **Soot Blower-Deslagger Sequence Controller**

**F-25** Rifle precision with up to four repeat cycles for each electrically driven retractable soot blower and wall deslagger in any pre-selected sequence, is the performance built into a new Selective-Sequence Controller manufactured by the **Copes-Vulcan Division, Blaw-Knox Company, Erie, Pa.**

Two types are available, the Model SSC-120 with control stations for 120 soot blowers, and the Model SSC-60 having control stations for 60 blowers. Both controllers are complete with indicating lights, master switch, selector switch, malfunction interlocks, annunciators and means for continuous timed blowing programs.

The heart of the Selective-Sequence Controller is the rotary stepping switch which positions the control to call into action the soot blowers in sequence as predetermined by the patch cord connections. Two stepping switches are used in the Model SSC-120 controller and only one in the Model SSC-60.

Control and interlock relays are of the plug-in type for easy testing and replacement, and are mounted inside the main dust-proof case. Unit-start relays, also of the plug-in type, are housed in individual dust-proof cases and mount on the outside of the rear controller-case door.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 103



#### **Panalarm Announcer pinpoints process "off-normals"**

In the process industries and among users of automatic machinery, trouble is minimized when it's caught early. That's the purpose of the Panalarm Announcer System—a continuous monitor of your process.

One typical adaptation of the modular Panalarm system is engineered to differentiate between the first "off-normal" and subsequent "off-normals" caused by the first. This feature allows instantaneous recognition of the prime source of trouble in a "chain reaction."

Another adaptation is designed specifically for motor start-up and shutdown. It has also been successfully adapted for supervisory control, pump control and programming.

Your Panalarm sales engineer will be happy to make a survey of your requirements to determine whether a Panalarm system can aid productivity and safety in your process. For electrical and mechanical data on standard systems, request Catalog 100B on your letterhead.



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-INDEX OF HELPFUL BOOKLETS, BULLETINS, REFERENCE LITERATURE-



### STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

**1—Package Boiler** — New compact, low cost package unit (oil or gas fired) for small space requirements is described in Bulletin DK-1. Pressures to 325 psi, steam capacities to 45,000 lb/hr.—E. KEELER CO.

**2—Water Tube Boilers** — Shop-assembled "package" gas-oil or combination fired units described in 8 page brochure. Pressures to 600 psig; 1,000 to 20,000 lb/hr. — design features, installations. — VULCAN STEEL TANK CORP.

**4—Steam Generators** — Bulletin AXY-1 describes auxiliary equipment and design features of the Amesteam Generator for sizes 10 through 600 hp and illustrates how this integrated design reduces cost and increases life and reliability. — AMES IRON WORKS, INC.

**13—Power Plant Equipment** — 12 page booklet No. 1022-A gives details on combustion and boiler feedwater control, pressure reducing, desuperheating and automatic soot blowing — retractable and rotary. — COPES-VULCAN DIVISION, BLAW-KNOX COMPANY.

**16—Small Boiler Performance** — AS Brochure shows how the packaged Ljungstrom air preheater boosts performance. Boilers as small as 25,000 lb/hr can have advantages of regenerative preheating—saves fuel, boosts output, and permits use of lower grade fuels.—THE AIR PREHEATER CORPORATION.

**83—Steam & Hot Water Generators** — Booklet describes company's line of fifteen compact models from 18 to 500 hp (15 to 200 psi). Only five connections needed; no special foundation.—CYCLOTHERN DIVISION, NATIONAL-U.S. RADIATOR CORP.

**85—Blow-Off Valves** — Bulletin E-125 describes design and construction of quick-operating valves, angle valves, Y valves and duplex units specifically designed for boiler blow-off service. — EVERLASTING VALVE CO.

**89—Solid-Wheel Turbine** — Bulletin S-116 gives complete details on Terry solid-wheel turbo-gear units; blades cannot foul; no need for close axial blade clearance. — TERRY STEAM TURBINE COMPANY.

**91—Steam Generators** — 18 sizes, from 20 to 600 bhp, for pressures to 250 psi, also for hot water. Com-

plete details in Catalog 811F. — SUPERIOR COMBUSTION INDUSTRIES, INC.

**96—Packaged Gas Burner** — Non-premixing ring gas burner incorporates flame retention regardless of air velocity. Factory assembled forced draft Series H packaged units for gas, rotary oil or combination described in Series B13 literature. — THE WEBSTER ENGINEERING COMPANY.

**98—Blow-Off Valves** — Bulletin B-426 describes valves widely used for low and medium pressures. No seat to score, wear, clog or leak. — YARNALL-WARING COMPANY.

### FANS — PUMPS — COMPRESSORS HEATERS — HEAT EXCHANGERS

**101—Heat Exchangers** — Bulletin 1.1K5 describes exchangers widely used on engines, compressors and other machinery for cooling lube oil, jacket water, air and gas. Compact, standardized units in wide range of sizes. — ROSS HEAT EXCHANGER DIVISION.

**123—Slurry Pump** — Catalog describes the new SP-90 slurry pump which permits proportion of slurries in the mix tank to remain constant, with pumping rates variable from maximum to 1/5 of maximum. — MANZEL.

**124—Blowers, Fans, Heaters, Drives** — Bulletin B-4729 — Describes the comprehensive and complete line of equipment manufactured by American Blower for practically every known air handling requirement and for smooth transmission of power through Gyrol fluid drives. — AMERICAN BLOWER CORP.

**129—Portable Compressor** — Bulletin 2307 describes Gyro-Flo 85, an oil-cooled, single-stage rotary sliding vane compressor, the lightest able ever developed. — INGER-SOLL-RAND CO.

**134—Mechanical Draft Service** — "CR" radial wheel draft fans for stoker fired or pulverized coal boilers described in Bul. FD 205. Also handles air with dust loadings in wide range of industrial jobs. — BUFFALO FORGE COMPANY.

**142—Centrifugal Pumps** — Full line of single stage horizontal split case centrifugal pumps described in 12 page Bulletin 7216; capacities 200-6400 gpm; heads up to 260 ft; maximum standardization and inter-

changeability of parts. — GOULDS PUMPS, INC.

**153—Chemical Process Pumps** — Bulletin B-1608 covers Type DL & DM units with oil & grease lubricated bearing houses. Packing gland or shaft seal designs. Air or water cooled back plates. Heads to 430 ft; capacities to 800 gpm. Pressures to 400 psig. — PEERLESS PUMP DIV.

**160—Boiler Feed Pumps** — 12 p Bulletin 122 describes and illustrates the type BFI high pressure pumps. Design features, service ratings and engineering data included.—PACIFIC PUMPS, INC.

**165—After-Cooler** — Bulletin 130 shows how the Aero unit removes moisture from compressed air or gases; "cools water for jackets and intercoolers; cools air or gases in both power and process systems; and protects air tools and pneumatic systems from water damage.—NIAGARA BLOWER COMPANY.

**177—Hand Pumps** — Bulletins 320 and 350 describe and illustrate hand pumps used for transferring liquids from drums, vats, tanks, underground storage tanks, etc. — BLACKMER PUMP COMPANY.

**185—Screw Pump** — Bulletin describes the new type TS — capacity to 600 gpm, pressure to 450 psi, viscosity to 150,000 ssu and speed to 3000 rpm. — WARREN PUMPS, INC.

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### INSTRUMENTS — METERS CONTROLS — REGULATORS

**206—Static Switching** — Bulletin GEA-6364 describes element for industrial control systems—what it is, what it looks like, how it works, advantages over relay control. — GENERAL ELECTRIC CO., Industry Control Dept.

**221—Boiler Water Level Controls** — Catalog describes exclusive magnetic operating principle. Low water cut-offs (single stage); pump controls; low and high water alarms; and water columns. Complete line 0-900 lb. wsp.—MAGNETROL, INC.

**222 — Pressure Regulators** — Catalog 76—Gives complete detailed information covering applications, operation and specifications of Reducing Valves, Pump Pressure Regulators and Back-Pressure Regulators. Included is a simple, practical method for selecting size of regulators.—MASON-NEILAN DIV.

**235 — Liquid Levels** — Bulletin 532 describes indicator which gives a reliable, automatic reading of storage tank contents. 20" dial in 3 x 10" case saves panel space. No outside power source needed; can be located up to 250 ft. from tank.—THE LIQUIDOMETER CORP.

**253 — Combustion Analyzer** — 4 p Specification E65-5 describes the "Heat Prover" which indicates per cent by volume oxygen and combustibles present in exhaust gases from all types of boiler and industrial furnaces. — BAILEY METER COMPANY.

**278 — Pressure Control Pilots** — Narrow band pressure control with stability featured in Bulletin 5303. Pilot ideal for systems with short lag factors.—LESLIE CO.

**290—Small-Size Gauges & Receivers** — Bulletin V5 covers new line of easy-to-read gauges and receivers which save panel space, make more compact groupings and still get ac-

curacy and dependability. Five inch illuminated scales; multiple or individual mounting — draft, pressure & vacuum, differential pressure, temperature. — REPUBLIC FLOW METERS CO.

**291 — Pneumatic Loading Stations** — New line of auto-manual units of non-seal type described in Bulletin 1031. Applicable to combustion control, feed-water regulation, pressure-reduction systems, desuperheating stations in steam power plants.—COPES-VULCAN DIVISION.

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**304 — Backing Rings** — Bulletin 56-2 describes rings designed for fast economical fit-up in piping, tubing, fittings and valves. Shows how rings assure uniform complete-penetration

welds and ease of handling in both shop and field. Carbon steel, wrought iron, chrome alloys, stainless, aluminum and copper.—ROBVON BACKING RING COMPANY.

**306 — Steel Buildings** — Catalogs cover Series S buildings (clear span widths from 4-40 ft) featuring Steelox panel construction; and Series P buildings (clear-span widths up to 100 ft); fire resistant & weather tight; simplified design eliminates much job-site labor. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

**367 — Industrial Track** — How you can save with relaying rails outlined in Catalogs RT-9. Covers switch material and accessories.—L. B. FOSTER CO.

**370—Welding Rod Guide**—32 page DirectoRod Guide helps you select from 160 rods those that will

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371—**Storage Racks**—How you can make your own with Tube-Strut universal clamps described in TSB-2. One clamp builds every type of storage rack. Used with ordinary pipe or tubing. — TUBE-STRUT DIVISION.

384—**Floor Grating**—Catalog No. AT254—Describes company's free planning and checking service for completely custom fabricated floor grating installations. — BORDEN METAL PRODUCTS CO.

393—**Shredders, Grinders & Hashers**—16 page Catalog 907 contains information on reducing cork, pulp laps, wood chunks, rubber, citrus fruits, animal waste, bones, etc.—JEFFREY MFG. CO.

#### PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

##### 401—Underground Pipe Insulation

4 p Brochure L-101-F-56 discusses problems of underground pipe insulation and explains how Gilsulites' special properties overcome them. On-the-job photos illustrate ease and speed of application. Thermal coefficients of transmission and other technical data and specifications are given.—AMERICAN GILSONITE COMPANY.

##### 408—Wide-Range Valves

Sheet 10-5 covers the "Point 4 Factor Trim"—answer to those few types of applications where reduced capacity trim is desirable. Available in V-port and solid turned designs for double or single seated valves and in wide variety of material.—MASON-NEILAN DIV.

##### 417—Welding Fittings

—192 page Cat. 54 gives design data on piping and piping application including digests of specifications, working pressures, design formulas, etc. Covers welding fittings, prefabricated pipe, forged steel flanges, and pipe coils.—MIDWEST PIPING COMPANY, INC.

##### 425—Steam Trap

with only three parts — cap, disc and body described in Bulletin 257. No valve closing mechanisms. Only moving part is solid stainless steel disc. Same trap for all loads and pressures 10-600 psi.—SARCO COMPANY, INC.

427—Diaphragm Valves—Valves for common and corrosive services described in Circular AD-1942. Have independent seating and bonnet sealing.—CRANE CO.

445—Heat Transfer Medium—How new solid medium can give you savings up to 75% over jacketed equipment outlined in brochure. Non-metallic plastic compound easily applied in paste form over either steam traced or thermal electric systems; wide temperature range.—THERMON MFG. CO.

459—Motor Units—Catalog 51 covers units for valves, floorstands and sluice gates. Features include: low maintenance, no drift, low backlash and easy installation of steam tight, weatherproof units.—THE CHAPMAN VALVE MANUFACTURING CO.

484—Pressure-Seal Valves—Circular 16 gives information on the wide range of sizes and types of pressure-seal valves which are available in Series 600, 900, 1500 and 2500.—WALWORTH.

487—Plastic Valves—6 p circular illustrates new Luncor valves and fittings. All-moulded corrosion-resistant PVC valves made to handle wide range of acids and alkalis and to resist chemical attack and deterioration.—THE LUNKENHEIMER CO.

491—High Pressure Control Valve—Model 9460 for working pressures to 6,000 psi described in Bulletin 9400. Features include split second action and small flow control.—THE ANNIN COMPANY.

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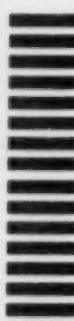
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**493 — Unions & Valves** — Complete company line of pipe unions and check valves covered in Catalog 56. New Four-Star lug nut unions & spring controlled check valves included. — CATAWISSA VALVE & FITTINGS COMPANY.

#### MAINTENANCE PACKING GASKETS, LUBRICATION

**502 — Hazardous Liquid Gasket Material** — How type 662 gaskets can stand varying climatic conditions without drying, shrinking, or hardening described in Bulletin AD-146. For use against gasoline, water and oil at temperatures up to 300 F. Has Underwriters' Laboratories, Inc., approval. — THE GARLOCK PACKING COMPANY.

**509 — Rust Solvent** — Data sheet describes "Liquid Wrench" a penetrating rust solvent that loosens rusted bolts, nuts, screws and "frozen" parts. Safe for all metals and alloys. — RADIATOR SPECIALTY CO.

**531 — Stack Maintenance** — How wrought iron offers unique defense against flue gas corrosion described in bulletin "Wrought Iron for Flue Gas Conductors." — A. M. BYERS COMPANY.

**552 — Packing Removal Tool** — Bulletin DHSP describes the Dura Hook that "works around corners" for removing old packing from stuffing boxes. — DURAMETALLIC CORPORATION.

**561 — Return Line Corrosion** — Bulletin CP-100 discusses Amine treatment, an effective and economical way to eliminate corrosion troubles. — THE BIRD-ARCHER COMPANY.

**598 — Valve-in-Line Reseaters** — Bulletins describe power-driven, one-man operated reseaters (pneumatically or electrically powered) for modern gate and globe valves. Reduces grinding time to minutes. Saves money on valve inventory and maintenance. — THE LEAVITT MACHINE COMPANY.

#### ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

**601 — Fluid Drive** — Bul. 9819 describes features of improved Type T Gyrol Fluid Drive for general industrial applications. Applications and advantages noted; rating charts give hp ranges for various engine and electric motor drive speeds. — AMERICAN BLOWER CORPORATION.

**604 — Motor Units** — Catalog 51 describes motor units for accurate performance and longer, lower cost life for operation of valves, floor-stands and sluice gates. — CHAPMAN VALVE MANUFACTURING CO.

**610 — Flexible Couplings** — All metal couplings described in Catalog 51A have no wearing parts; offer freedom from backlash, torsional rigidity; free end float; smooth con-

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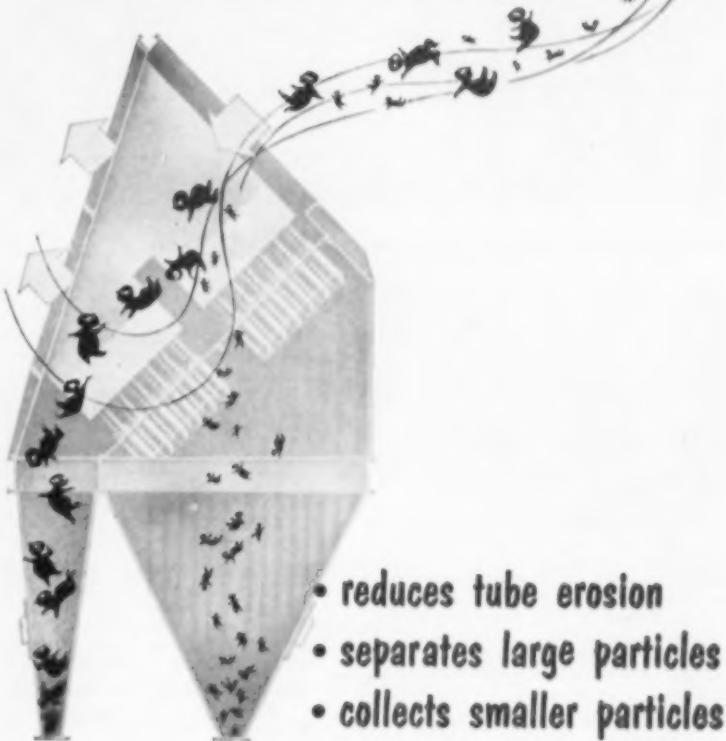
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**612 — V-Belt Sheaves** — Brochure shows how Maxi-Pitch sheaves provide rugged, economical service wherever variable speed power transmission is desired. Available in both stationary or motion control, stub or thru shaft models. — V-BELT ENGINEERING CO.

**613 — Monorail Applications** — Bulletin C-1 — "Handling Problems Solved" — gives hundreds of illustrations of monorail applications to handling problems in various industries. Equipment advantages also illustrated. — AMERICAN MONORAIL CO.

**626 — Personnel Elevators** — Industrial personnel elevators, available in 1, 2 and 4 passenger sizes (300-1000 lb capacity), described in Catalog 5A-156. Gives specifications and dimensional layouts. — J. B. EHRSAM & SONS MFG. CO.

**630 — Mechanical Vibrating Conveyors** — Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length. — JEFFREY MFG. CO.

**631 — Screw Conveyors** — Catalog ID-541, 68 pages — Illustrates and describes standard and special types of conveyors, with engineering data necessary for selection. Tables give sizes, types, speeds, horsepower and other information. Accessories included. — CONTINENTAL GIN COMPANY, INDUSTRIAL DIVISION.

**642 — Electric Hoists** — Bulletin 410 describes Series "700" Load Lifter hoists for loads up to 15 tons on a heavy-duty cycle. A ton can be lifted a foot a second. — SHAW-BOX CRANE & HOIST DIV.

**694 — Stock Roller Chains and Sprockets** — Catalog No. 754, 66 pages — Describes and illustrates Stock roller chains and sprockets including minimum and finished bore, ready-to-use TaperLock bushed sprockets, as well as chain selection and application data. — DIAMOND CHAIN COMPANY, INC.

#### WATER TREATMENT, HEATING VENTILATING, AIR CONDITIONING REFRIGERATION, DUST & FUME CONTROL

**700 — Water Conditioners** — 4 p brochure describes Anco water conditioners for hot-water and humidifying systems. Stop rust and corrosion; prevent discolored water. — ANDERSON CHEMICAL COMPANY, INC.

**701 — Exhausting Corrosive Fumes** — Bulletin 702-A shows how corrosive fumes can be exhausted with rubber, lead lined or specially coated fans. — CLARAGE FAN CO.

**706 — Automatic Roof Cooling** — Bulletin shows how automatic evaporative roof cooling can reduce inside temperature 8 to 15° without

air conditioning; increase roof life; and reduce fire hazards. Many Southern installations. — APRIL SHOWERS — SOUTHERN.

**713 — Electric Precipitators** — 26 page Bulletin 104 shows how units meet five engineering requirements — Positive control of gas flow; high, uniform electrode emission; Effective continuous cycle rapping; Simple, rugged construction; and Safe, trouble-free high voltage equipment. Gives 9 time-tested steps to a successful installation. — BUELL ENGINEERING COMPANY.

**715 — Amine Treatment** — Return line corrosion is a critical problem in maintaining economical, efficient power plant operation. Bulletin CP-100 shows how amine treatment is an easy, effective and economical way to eliminate pipe corrosion problems. — THE BIRD ARCHER COMPANY.

**722 — Packaged Deionizers** — Bulletin PK describes complete line of de-ionizers, which produce chemically pure water at flow rates up to 1000 gph. Standardized units, shipped from factory fully-assembled, eliminating complicated installation problems, and virtually eliminating service problems. Recommended for laboratory and plant production uses. — ILLINOIS WATER TREATMENT COMPANY.

**743 — Cooling System Cleaning** — Bulletins show how Former crystals will prevent scale formation and corrosion and remove existing deposits. No proportioning devices needed. — THE PEROLIN COMPANY, INC.

**754 — Power Roof Ventilators** — 8 page Bulletin 3904 describes 16 sizes of up-blast type units; 21 sizes of hood type exhaust units; and 20 sizes of hood type supply units. Fan speeds and motor hp included. — AMERICAN BLOWER CORP.

**764 — Cooling Equipment** — Bulletin 80-D describes company's complete line of commercial and industrial equipment — operating principles, design features, etc. — FRICK CO.

#### ELECTRICAL

**803 — Shielded Electrification** — Bulletin KS-1 describes "Kant Shock" for monorail and crane systems. Shielding prevents accidental contact with live bus bars. Eliminates all hazards of open bar conductors, prevents costly accidents, protects employees and reduces insurance rates. — AMERICAN MONORAIL.

**831 — Electric Heating Cable** — Bulletin F-1527 — Describes "Therm-wire," a low cost, easily applied flexible electric heating cable, a versatile new product with many uses and applications in industrial and commercial processing. — EDWIN L. WIEGAND CO.

**852 — Autotransformer Starter** — With air break contacts up to 75 hp, 220 v; 150 hp, 440-550 v is described in Bulletin 646. Silver alloy contacts stay in good condition without filing, cleaning or dressing. — ALLEN-BRADLEY.

**855 — Wiring Analyzer** — 4 page bulletin describes Model 301 Adequate Wiring Analyzer which quickly, simply and easily tests wiring without confusing calculators or slide rules. — SPRAGUE ELECTRIC COMPANY.

**869 — Heaters & Devices** — 72 page Bulletin BEC-1005H includes information on re-designed cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. Describes ceramic-to-metal and plastic resin hermetic seals. Also contains power requirements section. — GENERAL ELECTRIC CO.

**871 — Electrical Protection** — Protection Handbook — Tells how to protect motors, apparatus and circuits. Gives National Electrical Code requirements in simplified form. Designed to help the electrical or plant maintenance engineer. — BUSSMANN MFG. CO.

**874 — High-Voltage Cable** — Bulletin EB-27 gives full details on performance of Type AB insulation in 15 Industry Specification Tests, including operating temperature. — ANACONDA WIRE & CABLE COMPANY.

**879 — Commutator Maintenance** — 27 page booklet B-6150-A contains information on brush and commutator maintenance. Includes maintenance requirements, factors affecting commutation and carbon brush materials. — WESTINGHOUSE ELECTRIC CORP.

#### OPERATING AIDS SUPPLIES & MISCELLANEOUS

**909 — Industrial Skin Cleanser** — Folder describes Vi-Lan Clean, a non-alkaline, non-acid, all-purpose antiseptic skin cleanser that prevents dermatitis and other skin conditions. Self-service dispensing units. — DAMERON ENTERPRISES, INC.

**911 — Rescue Kit** — Bulletin 733 describes unit and procedure for freeing persons trapped in cars, buildings, under machines, in elevators, etc. — H. K. PORTER INC.

**936 — Stock & Weight Handbook** — 84 pages, gives complete information on all sizes and shapes of stainless and carbon steel products normally carried by steel warehouses. Useful charts and tables. — WAREHOUSE DIVISION, ATLANTIC STEEL COMPANY.

**937 — Steel Measuring Tapes** — Complete catalog describes full line of measuring tapes from 6 to 100 ft, including wide blade tape with upright measurements. — EVANS RULE CO.

#### Plant Maintenance Aids

**R-1 — Fireless Steam Cleaner** — Form 107-C describes the Fireless Steam Cleaner which provides plants having their own steam supply with the safe, practical and economical

way to clean with steam — no fire, no soot, no coils, no scale. — KELITE CORP., Los Angeles 12, Calif.

**R-2—Electric Plant Controls** — Catalog 57-S6 contains information on diesel starting, paralleling, changeover and alternating panels, load demand controls, battery chargers, gasoline engine remote control unit, and emergency electrical control. — AUTOMATIC SWITCH CO., Florham Park, N. J.

**R-3—Diesel Trouble Shooting** — Bulletin "Principles of Trouble Shooting for Cummins Diesels," doubling as a wall chart, lists complaints and causes for difficulty in air, fuel, lubricating and cooling systems, in operation and maintenance practices and in mechanical adjustments or repair. — CUMMINS ENGINE CO., INC., Columbus, Ind.

**R-4—Controlling Costs** — Bulletin G205RR designed as a guide for selecting the right scaffold for various classes of maintenance jobs — painting & cleaning, electrical work & maintenance equipment, plant repair & maintenance, and special jobs. — THE PATENT SCAFFOLDING CO., INC., 38-21 12th St., Long Island City 1, N. Y.

**R-5—Pipe Fabricating** — 16 page brochure photographically illustrates equipment, materials and processes, including pipe bending facilities, welders, x-ray machines, heat-treating furnaces, pipe & fittings inventories and other facilities for accurate, quality piping fabrication. — FLORI PIPE CO., 601 East Red Bud, St. Louis 15, Mo.

**R-6—V-Belt Maintenance** — 4 page folder "What Do YOU Do When V-Belts Stretch or Break" poses and answers questions on V-belt maintenance, inventory, wear, vibration. — THE MANHEIM MFG. & BELTING CO., 544 Stiegel St., Manheim, Pa.

**R-7—Titanium Pipe & Tubing** — 12 page TDC-185 presents in detail the size range and tolerances as well as a complete description of the mechanical, physical and working properties of titanium metal in tubular form. — BABCOCK & WILCOX CO., TUBULAR PRODUCTS DIV., Beaver Falls, Pa.

**R-8—Steel Fabrication** — Bulletin SD-237 depicts a few of the many unusual jobs the company has done in addition to fabrication of such standard items as dredge pipe, hot water storage and oil storage tanks of all kinds. — EQUITABLE EQUIPMENT CO., INC., 410 Camp St., New Orleans 12, La.

**R-9—Pressure Valve** — Data sheet describes service, construction,



They needed pumping capacity



They needed pumping pressure

## You can have capacity . . . or pressure . . . or both

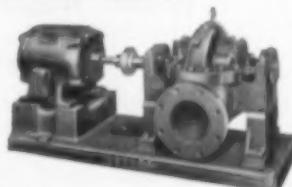
You can meet an exceptionally wide range of pumping needs with just two types of Goulds pumps.

**For volume pumping** — 33 sizes of the Fig. 3405 single-stage, double-suction pump provide capacities up to 6400 GPM, heads up to 425 ft.

**For great pressure** — 5 sizes of the Fig. 3305 two-stage pump provide heads up to 1000 ft., capacities to 1200 GPM.

All these extra features are *standard* on both groups:

1. Bearing housings sealed against dust and moisture.

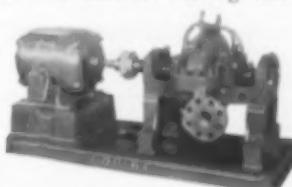


Goulds Fig. 3405 single-stage pump.

2. Renewable stuffing box bushings.
3. Die-formed stuffing box packing.
4. Cowl-type glands for use with quenching fluids.
5. Corrosion resistant gland bolts.
6. Stainless steel impeller keys.
7. Teflon water seal rings.

Because so many parts on these pumps are interchangeable—you can cut parts inventory in two or better.

For further information write for Bulletin 721.6 on the Fig. 3405; Bulletin 722.6 on the Fig. 3305.



Goulds Fig. 3305 two-stage pump.



West Coast Representative: Goulds Pumps Western, Portland, Ore.  
In Canada: The A. R. Williams Machinery Co., Ltd. in all principal cities.

Branches: Atlanta • Boston  
Chicago • Houston  
New York • Philadelphia  
Pittsburgh • Tulsa



That's right sir, Southern Water Conditioning is the largest in the South . . . Serving just the South to assure better and faster service. Top personnel with more than 32 years experience in the field.

## WHAT SOWACO OFFERS YOU!

### ★ Zeolite Water Softeners

Standard greensand, hi capacity greensand, synthetic gel, sulfonated coal, resin polystyrene, sodium and hydrogen ion exchangers, hot process

### ★ Filters and Purifiers

Sand — anthrofit — quartz — activated carbon — taste and odor removal — condensate oil removal

### ★ Modernized and Rebuilt Water Softeners

Increased capacities of older units as much as 300% (depending on type of zeolite) standard valve nests — multiport valves — semi automatic and fully automatic

### ★ Aerators and Depositors

Coke tray — slot tray — forced draft — induced draft for removal of iron — manganese — taste and odor — hydrogen sulphide — methane

### ★ Process and Boiler Water Conditioning

De-mineralizers — post treatments — zeolite — alkalinity neutralizers — split stream system — chemical treatment feeders. Misc. chemical treatments. Your inquiry survey made by competent personnel. Service after installation, periodic calls

### ★ Domestic Softeners—all types

Swimming pool filters, complete package units, Zeolite in stock, for immediate shipment

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**Southern Water Conditioning, Inc.**  
St. Petersburg, Fla.

Southern Water Conditioning, Inc.,  
315 15th Avenue So., St. Petersburg, Fla.

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As one Southern gentleman to another Southern gentleman, I would like to receive your illustrated brochures.

I would like detailed information on \_\_\_\_\_

Name \_\_\_\_\_

Company Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

operation and features of 16" air motor operated control & back pressure valve.—ATWOOD & MORRILL CO., Salem, Mass.

## USE READER SERVICE

See Service Cards  
Page 103

specifications for all drive sizes. — MANHATTAN RUBBER DIV., RAYBESTOS-MANHATTAN, INC., Passaic, N. J.

**R-10—Pump Valves**—8 page bulletin illustrates and describes pump valves, redesigned to incorporate new taper-lock stud, self-locking nut and drop-on guard. Includes pressure-temperature ratings, materials of construction, seat sizes and other dimensions. — DURABLA MFG. CO., 114 Liberty St., New York 6, N. Y.

### R-11—Centrifugal Pumps

Bulletin No. 3900-D describes line of end suction centrifugal pumps for general pumping and booster service. Includes tables and dimensions. — THE DEMING CO., Salem, Ohio.

### R-12—Temperature Regulators

4 page bulletin includes cross-sectional photographs and engineering drawings, construction features, principles of operation, specifications and table of dimensions and weights on packless balanced self-operating temperature regulators. — CASH STANDART STACON CORP., Box 551, Decatur, Ill.

### R-13—Plastic Pipe Markers

8 page catalog "How To Select the Best Self-Adhesive Pipe Marking Materials" lists over 500 self-adhesive Vinyl plastic pipe markers used by plant maintenance and safety engineers. — PRINTED CELLOPHANE TAPE CO., 521 North La Brea, Los Angeles 36, Calif., Dept. PR.

### R-14—Rotary Drills

Catalog No. TD 2-57 illustrates and describes complete line of Termite rotary masonry drills. Includes prices and recommended sizes. — TERMITIE DRILLS, INC., 99 N. Lotus Ave., Pasadena, Calif.

### R-15—Poly-V Belt Drives

112 page Data Book No. 10 gives engineering data for selection and design of Poly-V Belt Drives. Includes illustration, charts, tables, diagrams, and

**R-16—Fire Protection**—12 page Bulletin No. 76 discusses needs for fire protection in power plants, switchyards, and substations. Includes photos, diagrams and information applying to transformers and similar electrical installations in industrial plants. — AUTOMATIC SPRINKLER CORP. OF AMERICA, Youngstown 1, Ohio.

**R-17—Control Equipment**—Catalog 707 illustrates and describes pilots, level controls, diaphragm valves, regulators, relays, safety heads, flame arrestors, and tank vents. — BLACK, SIVALLS & BRYSON, INC., Kansas City, Mo. and Tulsa, Okla.

### R-18—Control Centers

8 page Booklet F 8031 discusses functions, uses and advantages of centralized automatic control with visual supervision of entire heating and air conditioning system. Illustrates and describes schematic remote control point adjustment, remote temperature indication and remote temperature recording. — BARBER-COLMAN CO., 1400 Rock St., Rockford, Ill.

### R-19—Seal-Tite Valves

Catalog 356A contains detailed description, specifications, installation dimensions, and ordering part numbers of Seal-tite Valves which give no leak service for air, gases, hydraulic oil, non-aromatic, fuel, petroleum, and water. — REPUBLIC MFG. CO., 15655 Brookpark Rd., Cleveland 11, Ohio.

## Atomic Waste Disposal (Continued)

(Starts on Page 82)

drum and shielded by pouring concrete between the two drums to reduce the radioactivity level of the outside surface of the drum to allowable tolerances. Drums will then be shipped to the coast for ocean burial.

Larger pieces of equipment which must be disposed of will be handled remotely and stored in an underground concrete vault

or suitably buried in a site "graveyard."

### Control Methods

A site monitoring program was started early in 1956 and will continue during operation of the plant. A pre-operational phase of this program is to determine the types and amounts of radioactive materials which occur naturally

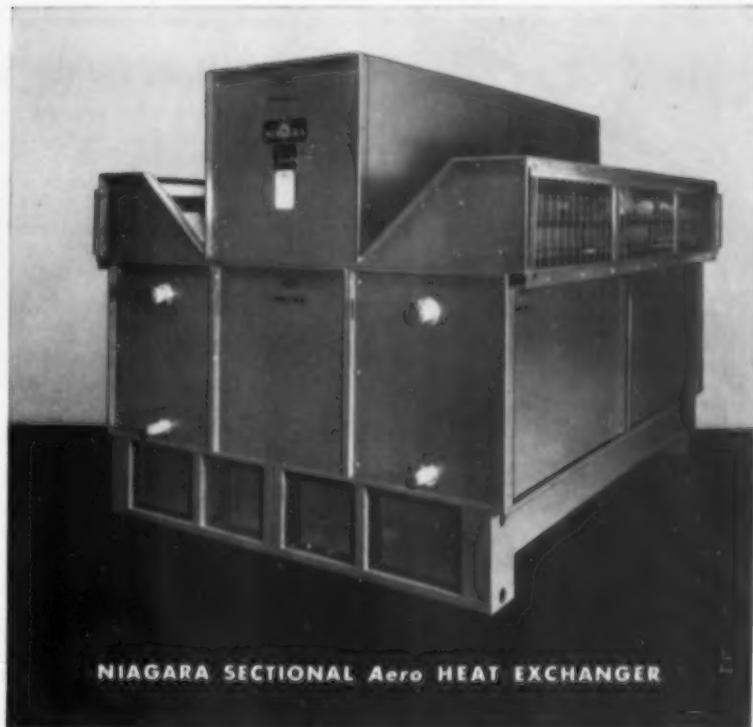
in the environment around the site and to determine the variations in the amounts of these materials over a period of approximately 1½ years prior to start-up of the nuclear portion of the plant. This will allow an evaluation of the environmental radioactivity so that similar studies conducted after plant operations will insure that the operation of the nuclear plant meets allowable tolerances.

Evaluations are being made on (1) soil in the general vicinity of the plant, (2) the Ohio River water both above and below the site, (3) well water within a one mile radius of the site, (4) vegetation in this general area, and (5) the air in this general area.

In order to properly evaluate the presence of radioactive dusts and gases in the air, and to measure the normal background radiation in the vicinity, a group of five "mobile monitoring stations" are being operated. Four of these units are located at fixed stations while the fifth monitor will traverse the general area.

The four fixed locations were selected on the basis of wind directions and velocities which have been determined by the U. S. Weather Bureau over the past year. The stations are placed so as to indicate as accurately as possible the concentrations of radioactivity in the air both downwind and upwind of the plant site. The fifth station will be moved around to different locations to determine the relationships between the four fixed stations and other areas which may be of interest.

Currently mud samples are being taken from the river bottom from pools behind dams near the plant site. Samples of river algae are also being obtained. Data from these samples will be compared to data from similar samples after radioactive wastes from the plant are being discharged into the river to determine how these wastes are distributed in the river. The results of these tests and other tests as described above will be of immeasurable value in determining whether the waste disposal facilities are satisfactory or whether modifications should be made.



NIAGARA SECTIONAL Aero HEAT EXCHANGER

# WATER SAVING *with* Trouble-Free Cooling Equipment

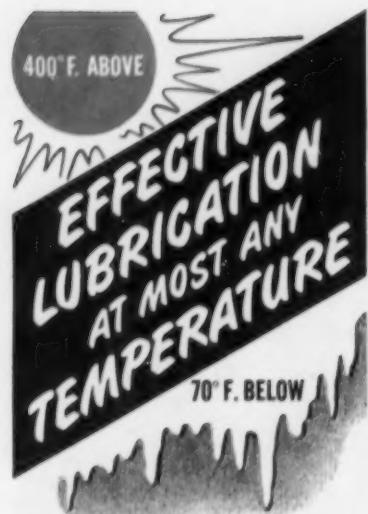
● Cools your jacket water for engines or process equipment or electric apparatus. Your closed system keeps free from dirt or maintenance troubles. You can cool air, gases, chemicals, plating baths, quench baths, welding machines, extrusion and drawing machines and hydraulic presses. You get real precise temperatures, save rejections, lower production costs. Use NIAGARA AERO HEAT EXCHANGER cooling with atmospheric air . . . saves water, pumping, piping and power; quickly saves its costs.

Convenient Units up to 30,000,000 BTU  
Capacity. Write for Bulletin No. 132.



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Dept. S.P.-6, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada



The fact that LUBRIPLATE Lubricants are able to meet extreme temperature conditions demonstrates the ability of these products to cope with the wide variations found in everyday industry. Besides this feature, LUBRIPLATE Lubricants possess attributes not found in conventional lubricants.

#### HIGH TEMPERATURES

**LUBRIPLATE No. 930-AA.**—Provides superior and protective lubrication for all types and sizes of machines operating at temperatures as high as 500°F. Possesses exceptionally high film strength and adhesiveness. Protects all metallic parts against rust and corrosion.

#### LOW TEMPERATURES

**LOW-TEMP LUBRIPLATE**—The outstanding multi-purpose grease type lubricant that will remain plastic at 70°F below Zero, yet has a Melting Point of 270°F. Resists water and acids—protects against rust and corrosion even from calcium chloride used on paved roads during winter months.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.



## News for the South & Southwest



#### Yale & Towne's Arkansas Plant Underway

Construction of the new \$4 million Yale materials handling equipment manufacturing plant and mid-continent parts depot has begun at **Forrest City, Arkansas**. Plant will have more than 157,000 sq ft of operating area.

When completed in mid-summer, **Yale & Towne's** new structure will be the center of production for the complete lines of Yale hand trucks and Yale hand hoists, now being manufactured at the company's materials handling equipment plant in Philadelphia. This will not only increase the company's capacity for hand truck and hand hoist production, but will also for powered industrial lift trucks and electric hoists at the Philadelphia plant.

The plant will be a major depot for the stocking of replacement parts for the complete lines of Yale materials handling equipment.

#### Chain Belt — Atlanta

Chain Belt Co. has appointed **D. P. (Dab) Murrill** as District Sales Manager of its Atlanta District Office and Warehouse.

Mr. Murrill joined Chain Belt Company in 1952 and after completing a sales and technical training course, was assigned to the Atlanta office as a district sales engineer.

**J. Frank McElwee, Jr.**, currently the Department's Tennessee Area Manager, located in Chattanooga, Tenn., office, will be Manager of the new South Atlantic District. **R. H. Jackson**, with headquarters in Atlanta, will be Manager of the **Southeastern** District, serving Georgia, Alabama, Florida, Mississippi and part of Louisiana.

#### Burgess-Manning — Charlotte

**Ray Sturgill and Associates**, Charlotte, N. C., have been appointed sales and service representatives of **Burgess-Manning, Penn Instruments Division**, in western North Carolina and eastern Tennessee. **R. A. McQuade**, Burgess-Manning, Penn Instruments Division manager, has announced.

The Charlotte firm will handle sales and service in both the industrial and municipal fields for the Penn Instruments Division, which manufactures electric and electronic flow meters and temperature and pressure recorders for utilities, water and sewage installations, industrial waste plants and for industry generally.

#### G-E — South

**General Electric's Apparatus Sales Division** is expanding its User Industries Sales Department activities in the South to keep pace with what Department Manager **A. R. Hines** describes as "a steadily increasing demand for electrical equipment" in the area.

Mr. Hines announced formation of a new **South Atlantic** Sales District to serve customers in North Carolina, South Carolina, Tennessee (formerly in the Southeastern District), and Virginia (formerly in the Atlantic District). Headquarters for the new district will be Charlotte, N. C.

### Reliance Steel Products Expands Southern Sales

Supporting recently announced additional sales outlets, **Reliance Steel Products Company** of McKeesport (Pittsburgh district) Pennsylvania, has appointed **John Karboska** district manager for Reliance steel grating, Relgrit, bridge flooring and other specialized equipment. He will have charge of the new district office at 250 East Forty-third St., New York City.

Southern representatives of Reliance Steel and Products include: **O. H. Whitehurst, Plant City Welding & Tank Co.** Plant City, Fla.; **Hugo A. Puls**, Birmingham, Alabama; **C. J. White, White and Company**, Houston, Texas; **Arthur M. Rothschild, Industrial Machinery, Inc.**, New Orleans, La.; **Murray R. Womble Co.** of Tulsa and Oklahoma City, Oklahoma; **J. Edgeworth Beatie**, Greenville, S. C., and **Shirm Supply & Specialty Co.** of Savannah, Georgia.

### Betz Laboratories — Pa.

W. H. & L. D. Betz has changed from the partnership form to the corporate form.

At the same time the company name has been changed from W. H. & L. D. Betz to **Betz Laboratories, Inc.**

### Gulf States — Ala.

Jack W. Warner, president of **Gulf States Paper**, has announced that **Archie Colby** has joined that firm as industrial engineer.



Mr. Colby was formerly General Sales Manager of Greer Hydraulics, Inc. Prior to his connection with the latter firm, he was Senior Associate in the management consulting firm of Bruce Payne and Associates.

### Chain Belt — Milwaukee

Two promotions at **Chain Belt Company**, Milwaukee, Wisconsin, were announced by A. R. Abelt, Vice President-Sales. Appointed to the new position of Manager-Market Development & Sales Training is **W. B. Marshall**, formerly Sales Promotion Manager.

**G. H. Pfeifer** is appointed to the new position of Manager-Sales Promotion and Advertising. He was formerly Advertising Manager.

### Chemstrand — Ala.

Production capacity of the **Chemstrand Corporation's** Acrilan acrylic fiber plant here will be expanded by 50 per cent, according to Edward A. O'Neal, Jr., president.

The plant, now operating at its full production rate of 30 million pounds annually, will be enlarged to 45 million pounds capacity. The new facilities are scheduled for completion in the first quarter of 1958.



## Flame Retention RING GAS BURNER

Through a new application of an old basic principle WEBSTER now offers unequalled stability in an non-premixing ring gas burner.

Presently packaged as Series H, Forced Draft for Gas, Rotary Oil or Combination this revolutionary development will soon be available in other variations.

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Open

*Write for Series B13 literature.*

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**TULSA 16, OKLAHOMA**

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

# Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!  
FOR ALL PRESSURES!  
FOR ALL TEMPERATURES!



Standard & Double  
Extra Heavy  
**UNIONS**

Available with  
screwed or socket  
weld ends. 3000-lb.  
sizes  $\frac{1}{2}$ " to 3";  
6000-lb. sizes  $\frac{1}{2}$ "  
to 2".



**ORIFICE  
UNIONS**

With screwed or  
socket weld ends.  
3000-lb. and 6000-lb.  
service.

**MALE & FEMALE  
UNIONS**

With steel-to-steel,  
bronze-to-steel, stain-  
less steel-to-steel or  
orifice seats. 3000-lb.  
service only.



**FULL STAINLESS &  
FULL ALLOY  
STEEL UNIONS**

With screwed or  
socket weld ends.  
3000-lb. and 8000-lb.  
service.



**WRITE FOR CATALOG 56**  
Showing the Complete Catawissa  
line of Perfect Seal Products  
**CATAWISSA VALVE &  
FITTINGS COMPANY**  
950 MILL ST., CATAWISSA, PA.

## News for the South & Southwest (Continued)

### Ft. Worth Steel — South & Southwest

Three firms have recently been appointed distributors of "Fort Worth" mechanical power-transmission and materials-handling equipment manufactured by **Fort Worth Steel & Machinery Company**, Fort Worth, Tex., according to M. S. Jackson, Jr., vice president for sales.

The new distributors are: **E. J. Boyce & Sons, Inc.**, St. Louis, Mo., serving feed mills, grain elevators and grain processors throughout Missouri and Illinois; **W. L. Sonner Company of Texas**, Odessa, Tex., which serves pipeline and oil production companies and oil well servicing companies in a trade area that includes West Texas, the Texas Panhandle and eastern half of New Mexico; **W. L. Sonner Company, Inc.**, Shreveport, La., which serves all phases of the oil industry in Louisiana, Mississippi, Eastern Alabama, and Arkansas as far north as Little Rock.

### Rockbestos — South & Southwest

**Rockbestos Products Corporation** of New Haven, Conn., manufacturers of insulated wires and cables, has opened sales offices in **Atlanta, Georgia** and in **Dallas, Texas**.

The former New Orleans district sales office has been discontinued, and these two new offices have been established to serve the Southeast and Southwest sales territories.

**Luther M. Rudisill, Jr.** has been appointed District Sales Manager to serve the Southeast territory, with offices at 3127 Maple Drive, Atlanta, Georgia.

The new Dallas office, located at 4655 North Central Expressway, has been opened by **Warren S. Jones**, District Sales Manager for the Southwest territory, which will include the states of Louisiana, Texas and New Mexico.

### Link-Belt — Memphis

**Link-Belt Company** has been awarded a contract for one of the largest coal handling systems ever to be installed as initial equipment for the new **Thomas H. Allen Electric Generating Station** of the **Memphis Light, Gas & Water Division**, City of Memphis, Tennessee.

The new Memphis station, which will have an initial nominal rating of 750,000 kw with an expected gross capability of 862,500 kw, is expected to double in the next ten-year period. The initial capacity of the coal handling system will be 2,200 tons per hour.

The new Thomas H. Allen Electric Generating Station, to be built in the Ensley Plantation about 5 miles southwest of the business center of Memphis, has been engineered by Burns and Roe, Inc., who will also supervise its construction.

### Anderson — Ala.

The Board of Directors of **Anderson Electric Corporation**, Birmingham, Ala., has elected **C. E. Bitzer** to the newly created position of Vice President in Charge of Sales.

## Plant McManus Dedicated

Plant McManus, the Georgia Power Company's 40,000 kw steam-electric generating plant near Brunswick, was recently dedicated with more than 2,000 business, government, and civic leaders in attendance.

The plant helps to supply the power needs of the company's service area in the coastal and southeastern region of the state. Recent acquisition by the company of the properties of the Georgia Power and Light Company has emphasized even more the importance of Plant McManus to the industrial and economic life of South Georgia.

Within the past month the company has begun an expansion program at the plant which, upon completion in 1959, will increase its output by 75,000 kw.

## Robertshaw-Fulton — Knoxville

Two appointments in the sales department of Fulton Sylphon Division of Robertshaw-Fulton Controls Company have been announced by G. L. Ogdin, Jr., general sales manager.

Marvin G. Calhoun was named supervisor of the bellows sales division, after serving as application engineer since 1942.

He joined the Knoxville division in 1940 as an engineer following graduation from North Carolina State College with a degree in electrical engineering.

J. H. Fielden, who also joined Fulton Sylphon in 1940, was appointed applications engineer. A native of Knoxville, he has been with the company a total of 13 years.

## A-C — Milwaukee

J. S. Morgan has been appointed director of domestic sales for Allis-Chalmers Industries Group.

Morgan, who had been director of utility sales for the Industries Group, will be on the staff of the vice president, director of sales of the Group. He will be responsible for the administration and activities of the field sales organization of the Group which includes the General Products, Industrial Equipment, Nuclear Power, and Power Equipment Divisions.

## Trane — N. O.

A top level personnel change in The Trane Company sales office in New Orleans has been announced by D. C. Minard, Trane president. Trane is a major manufacturer of air conditioning and heating equipment.

William D. Graham, Sr., manager of the local office at Room 301, Delta Building, 348 Baronne Street, has announced his retirement effective May 15. He has headed up the local office since 1951, coming here from the Greensboro, N. C., office where he served as manager since 1946.

Succeeding Graham as manager will be Fred Manget, Jr., sales engineer with the Trane Dallas office since 1948.

The retiring manager has announced that he plans to move to Florida to reside and that his other plans are somewhat tentative.

Manget, 31, is a mechanical engineering graduate of Texas A & M, earning his degree in 1948. The same year he joined Trane and completed the company's Student Training Program. He was then assigned to the Dallas office as a sales engineer.

## Fairbanks — South

Leland L. Bogle has been appointed Sales Representative of The Fairbanks Company in the territory of Tennessee, Alabama and Northern Mississippi. It has been announced by James L. Ragland, Branch Manager of the Southern Division with office and warehouse at Rome, Georgia.

Mr. Bogle will sell the complete line of Fairbanks valves, trucks, casters and Dart unions.

## Pritchard — Texas

The Steel and Engineering Products Company of El Paso, Texas, has been named sales representative for New Mexico and the western tip of Texas by J. F. Pritchard & Company of California, Kansas City, Missouri, manufacturer of cooling towers for air conditioning, industrial applications and Pritchard Hydryers, packaged dehydration units for drying air or other gases.



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# Need for Creative Mentality Emphasized by Electronic Research Executive

INDUSTRY is concentrating so much effort on getting college trained engineers, regardless of their creative abilities, that much of the country's inventive talent is being wasted, an executive of a leading electronic research and development laboratory said at the opening of the annual convention of the Institute of Radio Engineers at the New York Coliseum.

"Strange as it seems, if Thomas A. Edison and the Wright brothers were twenty years old today, they would have great difficulty in finding technical positions worthy of their talents in American industry," Carl G. Sontheimer, Executive Vice President of CGS

Laboratories, Inc., Stamford, Connecticut, said in an interview.

"Most companies largely ignore the creative mentality in selecting young engineers," Mr. Sontheimer said, "and if a young engineer is creative, his initiative and inventiveness may be stifled rapidly in the organization of the average industrial corporation. Moreover, a college engineering degree in itself is no passport to success in advanced electronic research and development.

"We seem to have forgotten that many of the basic technical inventions — the electric light, the phonograph, and the airplane — to name but a few, were made

by men without an engineering degree. There are now many research problems which can be solved only by teams of men with formal scientific training, but the day of the 'attic inventor' is not past in electronic development.

"We feel that a man who has made electronics a hobby since his early teens is in general a better bet, degree or not, than a college-trained boy who took electronics simply because he heard it was a sure way to make a living. Naturally, the former boy hobbyist who has acquired a sound fundamental scientific education is most valuable to our kind of organization," Mr. Sontheimer said.

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## FUTURE EVENTS of Engineering Interest

**June 4-5: Power Rectifier Conference**: American Institute of Electrical Engineers; Morrison Hotel, Chicago, Ill. Raymond C. Mayer & Assoc., 36 West 46th St., N. Y. 36, N. Y.

**ference**, Public Utilities Association of the Virginias, Daniel Boone Hotel, **Charleston, West Virginia**. R. W. McKinnon, Exec. Sec., PUA of the Virginias, 5 Franklin Rd., Roanoke, Va.

**June 5-8: 23rd Annual Meeting, National Society of Professional Engineers**: Statler-Hilton Hotel, Dallas, Texas. Kenneth E. Trombley, NSPE, 2029 K St., N. W., Washington 6, D. C.

**Sept. 20-21: 39th Annual Meeting**, Public Utilities Association of the Virginias, Greenbrier Hotel, **White Sulphur Springs, W. Va.** R. W. McKinnon, Exec. Sec., PUA of the Virginias, 5 Franklin Rd., Roanoke, Va.

**June 9-13: Fourth International Automation Exposition and Congress**: New York Coliseum, **New York**. Richard Rimbach, Assoc., Management, International Automation Exposition, 845 Ridge Ave., Pittsburgh 12, Pa.

**Sept. 22-25: Petroleum-Mechanical Engineering Conference**, ASME, Hotel Mayo, **Tulsa, Oklahoma**.

**June 9-13: Semi-Annual Meeting**, ASME, Sheraton-Palace Hotel, **San Francisco, Calif.**

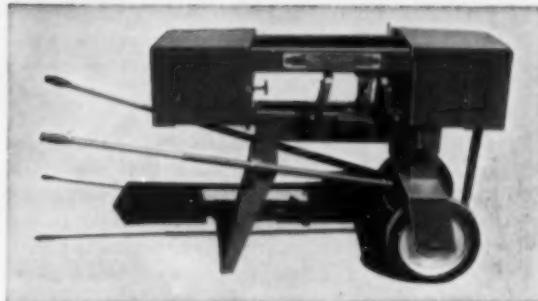
**Sept. 27: Oklahoma Regional Meeting**, Natural Gasoline Association of America, Skirvin Hotel, **Oklahoma City, Okla.** William F. Lowe, Sec., Natural Gasoline Assoc. of America, 421 Kennedy Bldg., Tulsa 3, Okla.

**June 14: Accident Prevention Con-**

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# ASME Surveys

## Engineering Education

**AMERICAN** industry may have to revise its battle plans in the fight to relieve the current shortage of engineering talent. This is one conclusion drawn from the results of a survey published recently by The American Society of Mechanical Engineers.

The survey, conducted at the annual meeting of ASME in New York last November and recently tabulated indicates that the majority of the engineers who answered think that industry should put more emphasis on increasing the productivity of engineers already employed. This would be in addition to continuing efforts to increase the number of students graduated by engineering colleges each year.

In response to the question, "What measures do you think should be taken to end the shortage of engineering manpower?" 65 per cent of the answers suggested changes in current industrial practices.

In the order of frequency these steps dealt with:

1. Providing engineers employed in industry with more technical assistants and clerical help, thereby freeing professional men for more creative work. (31%)

2. Increasing salaries to make the profession more attractive to

youngsters and to qualified engineers who have been lured to other fields by higher pay. (21%)

3. Improving the recognition and prestige accorded to engineers for their contributions to the economy. (12.5%)

Tabulations were based on a total of 880 men who said that they hold a degree in engineering. An additional 130 who attended the meeting and answered the questionnaire but did not claim an engineering degree were tabulated separately.

Commenting on the survey Dr. William F. Ryan, president of ASME said, "It is apparent to me, from these results, that many efforts remain to be made by American industry before we can say we are doing all we can. The idea that engineers need more sub-professional assistance is a recurring one. So is the suggestion of higher salaries, despite the fact that starting incomes, at least, are at an all-time high for the profession. In my own opinion the most urgent salary problem is the compensation of teachers in engineering schools. Without competent teachers we shall have no engineers."

"Most fundamental perhaps, is the well-founded feeling that engineers and their contributions to

our economy are not sufficiently appreciated. We live in the Age of Technology — the Age of the Engineer — but very few people know of the immense achievements of this professional group."

"It is probably fair to say that the bulk of industry's efforts resulting from this shortage have been aimed at recruiting more engineers for their own companies and in long-range efforts to encourage more men to enter the profession," Dr. Ryan continued. "Now it appears that we could use more efficiency in utilization of engineering talent right in our own engineering departments."

Fifteen per cent of the respondents suggested that the shortage could be alleviated by encouraging youngsters to enter the profession. An additional twenty per cent of the answers were classified under such headings as:

Improve high school courses 3 per cent, improve college courses 3 per cent, give financial support to colleges 1 per cent, and miscellaneous 9 per cent.

Additional questions on the survey dealt with the adequacy of high school and college education.

About 80 per cent said that the high schools which they had attended did a "good" or "superior" job in preparing them for an engineering education, while an additional 17 per cent said that their high schools were "fair" and 3 per cent said "poor." Following this however, half of the engineers said that today's high schools are not doing as good a job as their own had done.

Engineering colleges fared somewhat better, with 90 per cent saying their alma maters did a good or superior job in preparing them.

**Suggestions on improving high school and college preparation for engineering were classifiable into the following categories:**

### TO IMPROVE HIGH SCHOOLS

Improve technical courses	56%
Improve non-technical courses	10%
Enlist the support of Industry	6%
Better vocational guidance	6%
Better teachers and facilities	5%
Special attention for superior students	2%
More pay for teachers	2%
Miscellaneous	13%

### TO IMPROVE COLLEGES

Improve non-technical courses	28%
Improve technical courses	24%
Extend the present four year college program	13%
Enlist the support of Industry	10%
Better teachers & better facilities	5%
More applied courses	4%
More pay for teachers	2%
Improve vocational information	2%
Higher entrance requirements	2%
Miscellaneous	10%



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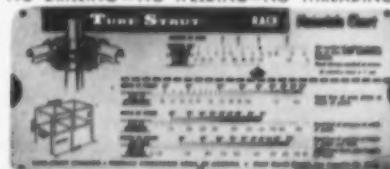
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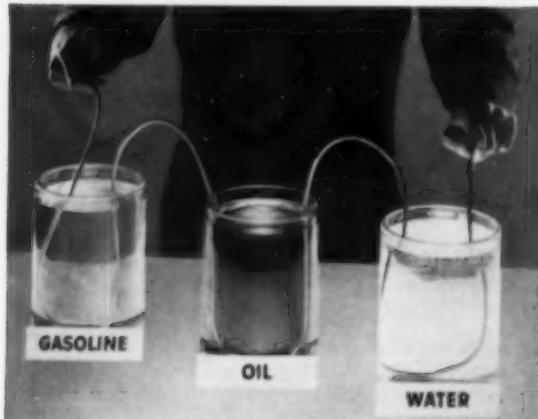
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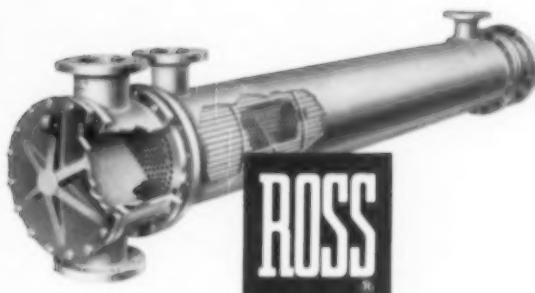
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Wheeler Mfg. Co., C. H.	*
Wiegand Co., Edwin L.	*
Wilson, Inc., Thomas C.	*

## Y

Yarnall-Waring Co.	57
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**"Efficient and well built" Ross Exchangers  
cool Enterprise Engines aboard hydraulic dredge**



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"We use Ross Exchangers for a number of reasons," reports Enterprise Engine & Machinery Co. "They are a popular, well-known exchanger recognized by consulting engineers as efficient and well built. Personalized service and sales effort on the part of the Ross people make it easy for us to buy Ross Exchangers. Their able assistance during the design period and while we are working out installation details are important factors in our selection."

Need more be said? Details on pre-engineered, standardized designs and sizes are contained in Bulletins 2.1K5 and 2.2K1 available on request. Ross Heat Exchanger Division of American-Standard, Buffalo 5, N. Y. In Canada: American-Standard Products (Canada) Limited, Toronto 5, Ont.

**ROSS HEAT EXCHANGER**

Division of **AMERICAN-Standard**



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